

6. References

- Aboulafia, D.M., Feigal, E., Vranzian, K., Bennett, C., Blattner, W., Moss, A. & Slamon, D. (1993) Human T cell leukemia virus (HTLV-I/II) serodiagnostic testing: disparate results among a cohort of intravenous drug users. *AIDS Res. hum. Retroviruses*, **9**, 1043–1050
- Abt, D.A., Marshak, R.R., Kulp, H.W. & Pollock, R.J., Jr (1970) Studies on the relationship between lymphocytosis and bovine leukosis. *Bibl. Haematol.*, **36**, 527–536
- Achiron, A., Pinhas-Hamiel, O., Doll, L., Djaldetti, R., Chen, A., Ziv, I., Avni, A., Frankel, G., Melamed, E. & Shohat, B. (1993) Spastic paraparesis associated with human T-lymphotropic virus type I: a clinical, serological, and genomic study in Iranian-born Mashhadi Jews. *Ann. Neurol.*, **34**, 670–675
- Adam, E., Kerkhofs, P., Mammerickx, M., Kettmann, R., Burny, A., Droogmans, L. & Willems, L. (1994) Involvement of the cyclic AMP-responsive element binding protein in bovine leukemia virus expression *in vivo*. *J. Virol.*, **68**, 5845–5853
- Akagi, T. & Shimotohno, K. (1993) Proliferative response of Tax1-transduced primary human T-cells to anti-CD3 antibody stimulation by an interleukin-2-independent pathway. *J. Virol.*, **67**, 1211–1217
- Al, B., Visser, S., van den Hoek, A., van Doornum, G., Coutinho, R. & Huisman, H. (1993) Incidence of HTLV-I/II infection in seronegative high-risk individuals. *J. med. Virol.*, **39**, 260–265
- Aldovini, A., De Rossi, A., Feinberg, M.B., Wong-Staal, F. & Franchini, G. (1986) Molecular analysis of a deletion mutant provirus of type I human T-cell lymphotropic virus: evidence for a doubly spliced *x-lor* mRNA. *Proc. natl Acad. Sci. USA*, **83**, 38–42
- Alexandersen, S., Carpenter, S., Christensen, J., Storgaard, T., Viuff, B., Wannemuehler, Y., Belousov, J. & Roth, J.A. (1993) Identification of alternatively spliced mRNAs encoding potential new regulatory proteins in cattle infected with bovine leukemia virus. *J. Virol.*, **67**, 39–52
- Alexandre, C., Charnay, P. & Verrier, B. (1991) Transactivation of *Krox-20* and *Krox-24* promoters by the HTLV-I Tax protein through common regulatory elements. *Oncogene*, **6**, 1851–1857
- Allain, J.-P., Hodges, W., Einstein, M.H., Geisler, J., Neilly, C., Delaney, S., Hodges, B. & Lee, H. (1992) Antibody to HIV-1, HTLV-I, and HCV in three populations of rural Haitians. *J. acquir. Immune Defic. Syndr.*, **5**, 1230–1236
- Ando, Y., Nakano, S., Saito, K., Shimamoto, I., Ichijo, M., Toyama, T. & Hinuma, Y. (1987) Transmission of adult T-cell leukemia retrovirus (HTLV-I) from mother to child: comparison of bottle- with breast-fed babies. *Jpn. J. Cancer Res. (Gann)*, **78**, 322–324
- Ando, Y., Tanigawa, T., Ekuni, Y., Ichijo, M. & Tohyama, T. (1993) Family study of women showing development of antibody to human T-cell leukemia virus I and assessment of the risk of vertical transmission of the virus to their children. *J. Infect.*, **27**, 151–155
- Aoki, T., Miyakoshi, H., Koide, H., Yoshida, T., Ishikawa, H., Sugisaki, Y., Mizukoshi, M., Tamura, K., Misawa, H., Hamada, C., Ting, R.C., Robert-Guroff, M. & Gallo, R.C. (1985) Seroepidemiology of human T-lymphotropic retrovirus type I (HTLV-I) in residents of Niigata Prefecture, Japan. Comparative studies by indirect immunofluorescence microscopy and enzyme-linked immunosorbent assay. *Int. J. Cancer*, **35**, 301–306

- Arai, E., Chow, K.-C., Li, C.-Y., Tokunaga, M. & Katayama, I. (1994) Differentiation between cutaneous form of adult T cell leukemia/lymphoma and cutaneous T cell lymphoma by in situ hybridization using a human T cell leukemia virus-I DNA probe. *Am. J. Pathol.*, **144**, 15–20
- Araki, S., Mochizuki, M., Yamaguchi, K., Watanabe, T., Ono, A., Yoshimura, K., Shirao, M. & Miyata, N. (1993) Familial clustering of human T lymphotropic virus type I uveitis. *Br. J. Ophthalmol.*, **77**, 747–748
- Araújo, A. de Q.-C., Afonso, C.R., Schor, D., Leite, A.C. & de Andrada-Serpa, M.J. (1993) Clinical and demographic features of HTLV-I associated myelopathy/tropical spastic paraparesis (HAM/TSP) in Rio de Janeiro, Brazil. *Acta neurol. scand.*, **88**, 59–62
- Asou, N., Kumagai, T., Uekihara, S., Ishii, M., Sato, M., Sakai, K., Nishimura, H., Yamaguchi, K. & Takatsuki, K. (1986) HTLV-I seroprevalence in patients with malignancy. *Cancer*, **58**, 903–907
- Babu, P.G., Gnanamuthu, C., Saraswathi, N.K., Nerurkar, V.R., Yanagihara, R. & John, T.J. (1993) HTLV-I-associated myelopathy in south India (Letter to the Editor). *AIDS Res. hum. Retroviruses*, **9**, 499–500
- Bangham, C.R.M. (1993) Human T-cell leukaemia virus type I and neurological disease. *Curr. Opin. Neurobiol.*, **3**, 773–778
- Bangham, C.R.M., Daenke, S., Phillips, R.E., Cruickshank, J.K. & Bell, J.I. (1988) Enzymatic amplification of exogenous and endogenous retroviral sequences from DNA of patients with tropical spastic paraparesis. *EMBO J.*, **7**, 4179–4184
- Bangham, C.R.M., Kermode, A.G., Hall, S.E. & Daenke, S. (1996) The cytotoxic T-lymphocyte response to HTLV-I: the main determinant of disease? *Sem. Virol.*, **7**, 41–48
- Baranger, A.M., Palmer, C.R., Hamm, M.K., Giebler, H.A., Brauweiler, A., Nyborg, J.K. & Scheparz, A. (1995) Mechanism of DNA-binding enhancement by the human T-cell leukaemia virus transactivator Tax. *Nature*, **376**, 606–608
- Barbara, J.A.J. (1994) HTLV-I in multiply transfused patients in Trinidad and Tobago (Letter to the Editor). *Vox Sang.*, **66**, 152
- Bartholomew, C., Charles, W., Saxinger, C., Blattner, W., Robert-Guroff, M., Raju, C., Ratan, P., Ince, W., Quamina, D., Basdeo-Maharaj, K. & Gallo, R.C. (1985) Racial and other characteristics of human T cell leukaemia/lymphoma (HTLV-I) and AIDS (HTLV-III) in Trinidad. *Br. med. J.*, **290**, 1243–1246
- Bartholomew, C., Edwards, J., Jack, N., Corbin, D., Murphy, J., Cleghorn, F., White, F. & Blattner, W. (1994) Studies on maternal transmission of HTLV-I in patients with adult T-cell leukaemia (ATL) in Trinidad and Tobago (Abstract no. 12). *AIDS Res. hum. Retroviruses*, **10**, 470
- Bastian, I.B., Gardner, J., Webb, D. & Gardner, I. (1993) Isolation of a human T-lymphotropic virus type I strain from Australian aboriginals. *J. Virol.*, **67**, 843–851
- Batsuuri, J., Dashnyam, B., Maidar, J., Battulga, D., Dorjsuren, D. & Ishida, T. (1993) Absence of human T-lymphotropic retrovirus type I (HTLV-I) in different populations of Mongolia. *Scand. J. infect. Dis.*, **25**, 398–399
- Bazarbachi, A., Saal, F., Laroche, L., Flageul, B., Périès, I. & de Thé, H. (1993) HTLV-I provirus and mycosis fungoides. *Science*, **259**, 1470–1471

- Bazarbachi, A., Soriano, V., Vallejo, A., Moudgil, T., Péries, J., de Thé, H. & Gill, P.S. (1995) Mycosis fungoides and Sézary syndrome are not associated with HTLV-I infection: an international study (Abstract no. 3702). *Blood*, **86** (Suppl. 1), 928a
- Beaufils, P., Choquet, D., Mamoun, R.Z. & Malissen, B. (1993) The (YXXL/I)₂ signalling motif found in the cytoplasmic segments of the bovine leukaemia virus envelope protein and Epstein-Barr virus latent membrane protein 2A can elicit early and late lymphocyte activation events. *EMBO J.*, **12**, 5105–5112
- Beilke, M.A., Greenspan, D.L., Impey, A., Thompson, J. & Didier, P.J. (1994) Laboratory study of HIV-1 and HTLV-I/II coinfection. *J. med. Virol.*, **44**, 132–143
- Beniashvili, D.S. (1989) An overview of the world literature on spontaneous tumors in non-human primates. *J. med. Primatol.*, **18**, 423–437
- Bentrem, D.J., McGovern, E.E., Hammar-skjöld, M.-L. & Edlich, R.F. (1994) Human T-cell lymphotropic virus type I (HTLV-I) retrovirus and human disease. *J. Emerg. Med.*, **12**, 825–832
- Benvenisty, N., Ornitz, D.M., Bennett, G.L., Sahagan, B.G., Kuo, A., Cardiff, R.D. & Leder, P. (1992) Brain tumours and lymphomas in transgenic mice that carry HTLV-I LTR/c-myc and Ig/tax genes. *Oncogene*, **7**, 2399–2405
- Béraud, C., Lombard-Platet, G., Michal, Y. & Jalinot, P. (1991) Binding of the HTLV-I Tax 1 transactivator to the inducible 21 bp enhancer is mediated by the cellular factor HEB1. *EMBO J.*, **10**, 3795–3803
- Berneman, Z.N., Gartenhaus, R.B., Reitz, M.S., Jr, Blattner, W.A., Manns, A., Hanchard, B., Ikehara, O., Gallo, R.C. & Klotman, M.E. (1992a) Expression of alternatively spliced human T-lymphotropic virus type I pX mRNA in infected cell lines and in primary uncultured cells from patients with adult T-cell leukemia/lymphoma and healthy carriers. *Proc. natl Acad. Sci. USA*, **89**, 3005–3009
- Berneman, Z.N., Gartenhaus, R.B., Reitz, M.S., Jr, Klotman, M.E. & Gallo, R.C. (1992b) cDNA sequencing confirms HTLV-I expression in adult T-cell leukemia/lymphoma and different sequence variations in *in vivo* and *in vitro*. *Leukemia*, **6** (Suppl. 3), 67S–71S
- Bhigjee, A.I., Kelbe, C., Haribhai, H.C., Windsor, I.M., Hoffmann, M.H., Modi, G., Bill, P.L.A., Becker, W.B., Singh, B. & Engelbrecht, S. (1990) Myelopathy associated with human T-cell lymphotropic virus type-I (HTLV-I) in Natal, South Africa. A clinical and investigative study in 24 patients. *Brain*, **113**, 1307–1320
- Bhigjee, A.I., Vinsen, C., Windsor, I.M., Gouws, E., Bill, P.L.A. & Tait, D. (1993) Prevalence and transmission of HTLV-I infection in Natal/KwaZulu. *S. Afr. med. J.*, **83**, 665–667
- Bieberich, C.J., King, C.M., Tinkle, B.T. & Jay, G. (1993) A transgenic model of transactivation by the Tax protein of HTLV-I. *Virology*, **196**, 309–318
- Biggar, R.J., Saxinger, C., Gardiner, C., Collins, W.E., Levine, P.H., Clark, J.W., Nkrumah, F.K. & Blattner, W.A. (1984) Type-I HTLV antibody in urban and rural Ghana, West Africa. *Int. J. Cancer*, **34**, 215–219
- Biggar, R.J., Gigase, P.L., Melbye, M., Kestens, L., Sarin, P.S., Bodner, A.J., Demedts, P., Stevens, W.J., Paluku, L., Delacollette, C. & Blattner, W.A. (1985) ELISA HTLV retrovirus antibody reactivity associated with malaria and immune complexes in healthy Africans. *Lancet*, **ii**, 520–523

- Biggar, R.J., Neequaye, J.E., Neequaye, A.R., Ankra-Badu, G.A., Levine, P.H., Manns, A., Taylor, M., Drummond, J. & Waters, D. (1993) The prevalence of antibodies to the human T lymphotropic virus (HTLV) in Ghana, West Africa. *AIDS Res. hum. Retroviruses*, **9**, 505–511
- Biggar, R.J., Taylor, M.E., Neel, J.V., Hjelle, B., Levine, P.H., Black, F.L., Shaw, G.M., Sharp, P.M. & Hahn, B.H. (1996) Genetic variants of human T-lymphotropic virus type II in American Indian groups. *Virology*, **216**, 166–173
- Bills, N.D., Hinrichs, S.H., Morgan, R. & Clifford, A.J. (1992) Delayed tumor onset in transgenic mice fed a low-folate diet. *J. natl Cancer Inst.*, **84**, 332–337
- Black, A.C., Ruland, C.T., Luo, J., Bakker, A., Fraser, J.K. & Rosenblatt, J.D. (1994a) Binding of nuclear proteins to HTLV-II *cis*-acting repressive sequence (CRS) RNA correlates with CRS function. *Virology*, **200**, 29–41
- Black, F.L., Biggar, R.J., Neel, J.V., Maloney, E.M. & Waters, D.J. (1994b) Endemic transmission of HTLV type II among Kayapo Indians of Brazil. *AIDS Res. hum. Retroviruses*, **10**, 1165–1171
- Blank, A., Yamaguchi, K., Blank, M., Zaninovic, V., Sonoda, S. & Takatsuki, K. (1993) Six Colombian patients with adult T-cell leukemia/lymphoma. *Leuk. Lymph.*, **9**, 407–412
- Blattner, W.A. & Gallo, R.C. (1994) Epidemiology of HTLV-I and HTLV-II infection. In: Takatsuki, K., ed., *Adult T-cell Leukaemia*, Oxford, Oxford University Press, pp. 45–90
- Blattner, W.A., Gibbs, W.N., Saxinger, C., Robert-Guroff, M., Clark, J., Lofters, W., Hanchard, B., Campbell, M. & Gallo, R.C. (1983) Human T-cell leukemia/lymphoma virus-associated lymphoreticular neoplasia in Jamaica. *Lancet*, **ii**, 61–64
- Blattner, W.A., Nomura, A., Clark, J.W., Ho, G.Y.F., Nakao, Y., Gallo, R.C. & Robert-Guroff, M. (1986) Modes of transmission and evidence for viral latency from studies of human T-cell lymphotropic virus type I in Japanese migrant populations in Hawaii. *Proc. natl Acad. Sci. USA*, **83**, 4895–4898
- Blattner, W.A., Saxinger, C., Riedel, D., Hull, B., Taylor, G., Cleghorn, F., Gallo, R.C., Blumberg, B. & Bartholomew, C. (1990) A study of HTLV-I and its associated risk factors in Trinidad and Tobago. *J. acquir. immun. Defic. Syndr.*, **3**, 1102–1108
- Blomberg, J., Moestrup, T., Frimand, J., Hansson, B.-G., Krogsgaard, K., Grillner, L. & Nordenfelt, E. (1994) HTLV-I and -II in intravenous drug users from Sweden and Denmark. *Scand. J. infect. Dis.*, **26**, 23–26
- Boeri, E., Abecasis, C., Varnier, O.E. & Franchini, G. (1995) Analysis of HTLV-I *env* gene sequence from an Italian polytransfused patient: evidence for a Zairian HTLV-I in Sicily. *AIDS Res. hum. Retroviruses*, **11**, 649–651
- Bohn Christiansen, C., Wantzin, P. & Dickmeiss, E. (1995) Prevalence of antibodies to HTLV-I/II in high-risk patients and blood donors in Denmark (Letter to the Editor). *Vox Sang.*, **68**, 63–64
- Bolton, W.V., Best, S.J., Davis, A.R., Kenrick, K.G. & Wylie, B.R. (1994) The first Australian case of human T-cell lymphotropic virus type II infection (Letter to the Editor). *Med. J. Aust.*, **161**, 451
- Bonis, J., Baillou, A., Barin, F., Verdier, M., Janvier, B. & Denis, F. (1993) Discrimination between human T-cell lymphotropic virus type I and II (HTLV-I and HTLV-II) infections by using synthetic peptides representing an immunodominant region of the core protein (p19) of HTLV-I and HTLV-II. *J. clin. Microbiol.*, **31**, 1481–1485

- Bosselut, R., Duvall, J.F., Gégonne, A., Bailly, M., Hémar, A., Brady, J. & Ghysdael, J. (1990) The product of the *c-ets-1* proto-oncogene and the related Ets2 protein act as transcriptional activators of the long terminal repeat of human T cell leukemia virus HTLV-I. *EMBO J.*, **9**, 3137–3144
- Bosselut, R., Lim, F., Romond, P.-C., Frampton, J., Brady, J. & Ghysdael, J. (1992) Myb protein binds to multiple sites in the human T cell lymphotropic virus type I long terminal repeat and transactivates LTR-mediated expression. *Virology*, **186**, 764–769
- Bouzas, M.B., Zapiola, I., Quiruelas, S., Gorgein, D., Panzita, A., Rey, J., Carnese, F.P., Corral, R., Perez, C., Zala, C., Gallo, D., Hanson, C.V. & Muchnik, G. (1994) HTLV type I and HTLV type II infection among Indians and natives from Argentina. *AIDS Res. hum. Retroviruses*, **10**, 1567–1571
- Brabin, L., Brabin, B.J., Doherty, R.R., Gust, I.D., Alpers, M.P., Fujino, R., Imai, J. & Hinuma, Y. (1989) Patterns of migration indicate sexual transmission of HTLV-I infection in non-pregnant women in Papua New Guinea. *Int. J. Cancer*, **44**, 59–62
- Brennan, M., Runganga, J., Barbara, J.A.J., Contreras, M., Tedder, R.S., Garson, J.A., Tuke, P.W., Mortimer, P.P., McAlpine, L. & Tosswill, J.H.C. (1993) Prevalence of antibodies to human T cell leukaemia/lymphoma virus in blood donors in north London. *Br. med. J.*, **307**, 1235–1239
- Brodine, S.K., Hyams, K.C., Molgaard, C.A., Ito, S.I., Thomas, R.J., Roberts, C.R., Golbeck, A.L., Oldfield, E.C., III & Blattner, W.A. (1995) The risk of human T cell leukemia virus and viral hepatitis infection among US Marines stationed in Okinawa, Japan. *J. infect. Dis.*, **171**, 693–696
- Bunker, C.B., Whittaker, S., Luzzatto, L., Gore, M.E., Rustin, M.H.A., Smith, N.P. & Levene, G.M. (1990) Indolent cutaneous prodrome of fatal HTLV-I infection (Letter to the Editor). *Lancet*, **i**, 426
- Burny, A. & Mammerickx, M., eds (1987) *Enzootic Bovine Leukosis and Bovine Leukemia Virus*, Boston, Martinus Nijhoff Publishing
- Burny, A., Willems, L., Callebaut, I., Adam, E., Cludts, I., Dequiedt, F., Droogmans, L., Grimonpont, C., Kerkhofs, P., Mammerickx, M., Portetelle, D., Van den Broeke, A. & Kettmann, R. (1994) Bovine leukaemia virus: biology and mode of transformation. In: Minson, A.C., Neil, J.C. & McRae, M.A., eds, *Viruses and Cancer*, Cambridge, Cambridge University Press, pp. 213–234
- Busch, M.P., Laycock, M., Kleinman, S.H., Wages, J.W., Jr, Calabro, M., Kaplan, J.E., Khabbaz, R.F., Hollingsworth, C.G. and the Retrovirus Epidemiology Donor Study (1994) Accuracy of supplementary serologic testing for human T-lymphotropic virus types I and II in US blood donors. *Blood*, **83**, 1143–1148
- Cabrera, M.E., Labra, S., Catovsky, D., Ford, A.M., Colman, S.M., Greaves, M.F. & Matutes, E. (1994) HTLV-I positive adult T-cell leukaemia/lymphoma (ATLL) in Chile. *Leukemia*, **8**, 1763–1767
- Cann, A.J. & Chen, I.S.Y. (1990) Human T-cell leukemia virus Types I and II. In: Fields, B.N. & Knipe, D.R., eds, *Virology*, New York, Raven Press, pp. 1501–1527
- Cann, A.J. & Chen, I.S.Y. (1996) Human T-cell leukemia virus types I and II. In: Fields, B.N., Knipe, D.M., Howley, P.M., Chanock, R.M., Melnick, J.L., Monath, T.P., Roizman, B. & Straus, S.E., eds, *Fields Virology*, 3rd Ed., Vol. 2, Philadelphia, Lippincott-Raven Publishers, pp. 1849–1880

- Cann, A.J., Rosenblatt, J.D., Wachsman, W., Shah, N.P. & Chen, I.S.Y. (1985) Identification of the gene responsible for human T-cell leukaemia virus transcriptional regulation. *Nature*, **318**, 571–574
- Capésius, C., Saal, F., Maero, E., Bazarbachi, A., Lasneret, J., Laroche, L., Gessain, A., Hojman, F. & Périés, J. (1991) No evidence for HTLV-I infection in 24 cases of French and Portuguese mycosis fungoides and Sézary syndrome (as seen in France). *Leukemia*, **5**, 416–419
- Cartier, L., Castillo, J.L., Cabrera, M.E., Araya, F., Matutes, E., Ford, A.M. & Greaves, M.F. (1995) HTLV-I positive progressive spastic paraparesis (TSP) associated with a lymphoid disorder in three Chilean patients. *Leuk. Lymph.*, **17**, 459–464
- Cassé, H., Girerd, Y., Gazzolo, L. & Duc Dodon, M. (1994) Critical involvement of human T-cell leukemia virus type I virions in mediating the viral mitogenic effect. *J. gen. Virol.*, **75**, 1909–1916
- Catovsky, D., Rose, M., Goolden, A.W.G., White, J.M., Bourikas, G., Brownell, A.I., Blattner, W.A., Greaves, M.F., Galton, D.A.G., McCluskey, D.R., Lampert, I., Ireland, R., Bridges, J.M. & Gallo, R.C. (1982) Adult T-cell lymphoma-leukaemia in blacks from the West Indies. *Lancet*, **i**, 639–643
- Cavrois, M., Gessain, A., Wain-Hobson, S. & Wattel, E. (1996) Proliferation of HTLV-I infected circulating cells *in vivo* in all asymptomatic carriers and patients with TSP/HAM. *Oncogene* (in press)
- Centers for Disease Control and Prevention (1992) Update: serologic testing for human T-lymphotropic virus type I. United States 1989 and 1990. *Morbid. Mortal. Wkly Rep.*, **41**, 259–262
- Cereseto, A., Diella, F., Mulloy, J.C., Cara, A., Michieli, P., Grassmann, R., Franchini, G. & Klotman, M.E. (1996) p53 functional impairment and high p21^{waf1/cip1} expression in human T-cell lymphotropic/leukemia virus type I (HTLV-I) transformed T-cells. *Blood* (in press)
- Cevallos, R., Barberis, L., Evans, L., Barriga, J., Verdier, M., Bonis, J., Leonard, G. & Denis, F. (1990) HIV-1, HIV-2 and HTLV-I seroprevalence surveys in continental Ecuador and Galapagos (Letter to the Editor). *AIDS*, **4**, 1300–1301
- Chadburn, A., Athan, E., Wiecezorek, R. & Knowles, D.M. (1991) Detection and characterization of human T-cell lymphotropic virus type I (HTLV-I) associated T-cell neoplasms in an HTLV-I nonendemic region by polymerase chain reaction. *Blood*, **77**, 2419–2430
- Chavance, M. & Fréry, N. (1993) Re: 'Declining seroprevalence and transmission of HTLV-I in Japanese families who emigrated to Hawaii' (Letter to the Editor). *Am. J. Epidemiol.*, **138**, 898–900
- Chavance, M., Fréry, N., Valette, I., Monplaisir, N. & Schaffar, L. (1989) Cohort effect of HTLV-I seroprevalence in southern Japan (Letter to the Editor). *Lancet*, **ii**, 1337
- Chen, I.S.Y., Quan, S.G. & Golde, D.W. (1983) Human T-cell leukemia virus type II transforms normal human lymphocytes. *Proc. natl Acad. Sci. USA*, **80**, 7006–7009
- Chen, Y.-C., Wang, C.-H., Su, I.-J., Hu, C.-Y., Chou, M.-J., Lee, T.-H., Lin, D.-T., Chung, T.-Y., Liu, C.-H. & Wang, C.-S. (1989) Infection of human T-cell leukemia virus type I and development of human T-cell leukemia/lymphoma in patients with hematological neoplasms: a possible linkage to blood transfusion. *Blood*, **74**, 388–394

- Chen, Y.-M., Lee, T.-H., Wiktor, S.Z., Shaw, G.M., Murphy, E.L., Blattner, W.A. & Essex, M. (1990) Type-specific antigens for serological discrimination of HTLV-I and HTLV-II infection. *Lancet*, **336**, 1153–1155
- Chen, C.-J., Hsieh, S.-F. & Yang, C.-S. (1994) Seroepidemiology of human T-lymphotropic virus type I infection among intravenous drug abusers in Taiwan. *J. med. Virol.*, **42**, 264–267
- Chen, Y.-X., Ikeda, S., Mori, H., Hata, T., Tsukasaki, K., Momita, S., Yamada, Y., Kamihira, S., Mine, M. & Tomonaga, M. (1995) Molecular detection of pre-ATL state among healthy HTLV-I carriers in an endemic area of Japan. *Int. J. Cancer*, **60**, 798–801
- Chironna, M., Quarto, M., Sabato, V. & De Mattia, D. (1994) HTLV-I infection in a thalassemic patient from Apulia (southern Italy) (Letter to the Editor). *Vox Sang.*, **67**, 321–322
- Chlichlia, K., Moldenhauer, G., Daniel, P.T., Busslinger, M., Gazzolo, L., Schirmacher, V. & Khazaie, K. (1995) Immediate effects of reversible HTLV-I *tax* function: T-cell activation and apoptosis. *Oncogene*, **10**, 269–277
- Chou, K.S., Okayama, A., Tachibana, N., Lee, T.-H. & Essex, M. (1995) Nucleotide sequence analysis of full-length human T-cell leukemia virus type I from adult T-cell leukemia cells: a prematurely terminated pX open reading frame II. *Int. J. Cancer*, **60**, 701–706
- Chrivia, J.C., Kwok, R.P., Lamb, N., Hagiwara, M., Montminy, M.R. & Goodman, R.H. (1993) Phosphorylated CREB binds specifically to the nuclear protein CBP. *Nature*, **365**, 855–859
- Cimarelli, A., Duclos, C.A., Gessain, A., Cattaneo, E., Casoli, C., Biglione, M., Maucière, P. & Bertazzoni, U. (1995) Quantification of HTLV-II proviral copies by competitive polymerase chain reaction in peripheral blood mononuclear cells of Italian injecting drug users, central Africans, and Amerindians. *J. acquir. Immune Defic. Syndr. hum. Retrovirol.*, **10**, 198–204
- Ciminale, V., Pavlakis, G.N., Derse, D., Cunningham, C.P. & Felber, B.K. (1992) Complex splicing in the human T-cell leukemia virus (HTLV) family of retroviruses: novel mRNAs and proteins produced by HTLV type I. *J. Virol.*, **66**, 1737–1745
- Ciminale, V., D'Agostino, D.M., Zotti, L., Franchini, G., Felber, B.K. & Chieco-Bianchi, L. (1995) Expression and characterization of proteins produced by mRNAs spliced into the X region of the human T-cell leukemia/lymphotropic virus type II. *Virology*, **209**, 445–456
- Clark, J., Saxinger, C., Gibbs, W.N., Lofters, W., Lagranade, L., Deceulaer, K., Ensroth, A., Robert-Guroff, M., Gallo, R.C. & Blattner, W.A. (1985a) Seroepidemiologic studies of human T-cell leukemia/lymphoma virus type I in Jamaica. *Int. J. Cancer*, **36**, 37–41
- Clark, J.W., Robert-Guroff, M., Ikehara, O., Henzan, E. & Blattner, W.A. (1985b) Human T-cell leukemia-lymphoma virus type I and adult T-cell leukemia-lymphoma in Okinawa. *Cancer Res.*, **45**, 2849–2852
- Clark, J.W., Gurgo, C., Franchini, G., Gibbs, W.N., Lofters, W., Neuland, C., Mann, D., Saxinger, C., Gallo, R.C. & Blattner, W.A. (1988) Molecular epidemiology of HTLV-I-associated non-Hodgkin's lymphomas in Jamaica. *Cancer*, **61**, 1477–1482
- Cleghorn, F., Charles, W., Blattner, W.A. & Bartholomew, C. (1990) Adult T-cell leukemia in Trinidad and Tobago. In: Blattner, W.A., ed., *Human Retrovirology: HTLV*, New York, Raven Press, pp. 185–190
- Cockerell, G.L., Weiser, M.G., Rovnak, J., Wicks-Beard, B., Roberts, B., Post, A., Chen, I.S.Y. & Lairmore, M.D. (1991) Infectious transmission of human T-cell lymphotropic virus type II in rabbits. *Blood*, **78**, 1532–1537

- Coffin, J.M. (1996) Retroviridae: the viruses and their replication. In: Fields, B.N., Knipe, P.M., Howley, P.M., Chanock, R.M., Melnick, J.L., Monath, T.P. & Roizman, B., eds, *Fields Virology*, 3rd Ed., Vol. 2, Philadelphia, Lippincott-Raven Publishers, pp. 1767–1847
- Cossen, C., Hagens, S., Fukuchi, R., Forghani, B., Gallo, D. & Ascher, M. (1992) Comparison of six commercial human T-cell lymphotropic virus type I (HTLV-I) enzyme immunoassay kits for detection of antibody to HTLV-I and -II. *J. clin. Microbiol.*, **30**, 724–725
- Coste, J., Lemaire, J.-M., Couroucé, A.-M., the Retrovirus Study Group of the French Society of Blood Transfusion & Canavaggio, M. (1993) Human T-lymphotropic virus (HTLV) type I and II: seroprevalence among intravenous drug users in continental France. *AIDS*, **7**, 440–441
- Couroucé, A.-M., Pilonel, J., Lemaire, J.-M., Maniez, M. & Brunet, J.-B. (1993) Seroepidemiology of HTLV-I/II in universal screening of blood donations in France. *AIDS*, **7**, 841–847
- Cruickshank, J.K., Rudge, P., Dalgleish, A.G., Newton, M., McLean, B.N., Barnard, R.O., Kendall, B.E. & Miller, D.H. (1989) Tropical spastic paraparesis and human T cell lymphotropic virus type I in the United Kingdom. *Brain*, **112**, 1057–1090
- Cruickshank, J.K., Corbin, D.O.C., Bucher, B. & Vernant, J.C. (1992) HTLV-I and neurological disease. *Ballière's clin. Neurol.*, **1**, 61–81
- Dada, A.J., Oyewole, F., Onofowokan, R., Nasidi, A., Harris, B., Levin, A., Diamondstone, L., Quinn, T.C. & Blattner, W.A. (1993) Demographic characteristics of retroviral infections (HIV-1, HIV-2, and HTLV-I) among female professional sex workers in Lagos, Nigeria. *J. acquir. Immune Defic. Syndr.*, **6**, 1358–1363
- Daenke, S., Parker, C.E., Niewiesk, S., Newsom-Davis, J., Nightingale, S. & Bangham, C.R.M. (1994) Spastic paraparesis in a patient carrying defective human T cell leukemia virus type I (HTLV-I) provirus sequences but lacking a humoral or cytotoxic T cell response to HTLV-I (Letter to the Editor). *J. infect. Dis.*, **169**, 941–943
- Daenke, S., Kermode, A.G., Hall, S.E., Taylor, G., Weber, J., Nightingale, S. & Bangham, C.R.M. (1996) High activated and memory cytotoxic T-cell responses to HTLV-I in healthy carriers and patients with tropical spastic paraparesis. *Virology*, **217**, 139–146
- Dalakas, M.C. (1993) Retroviruses and inflammatory myopathies in humans and primates. *Ballière's clin. Neurol.*, **2**, 659–691
- Dalekos, G.N., Zervou, E., Karabini, F., Elisaf, M., Bourantas, K. & Siamopoulos, K.C. (1995) Prevalence of antibodies to human T-lymphotropic virus types I and II in volunteer blood donors and high-risk groups in northwestern Greece. *Transfusion*, **35**, 503–506
- Dalgleish, A., Richardson, J., Matutes, E., Cruickshank, K., Newell, A., Sinclair, A., Thorpe, R., Brasher, M., Weber, J., Catovsky, D. & Rudge, P. (1988) HTLV-I infection in tropical spastic paraparesis: lymphocyte culture and serological response. *AIDS Res. hum. Retroviruses*, **4**, 475–485
- Davidson, M., Kaplan, J.E., Hartley, T.M., Lairmore, M.D. & Lanier, A.P. (1990) Prevalence of HTLV-I in Alaska Natives (Letter to the Editor). *J. infect. Dis.*, **161**, 359–360
- Dekaban, G., Oger, J.J.F., Foti, D., Fing, E.E., Waters, D.J., Picard, F.J., Arp, J., Werker, D. & Rice, G.P.A. (1994) HTLV-I infection associated with disease in aboriginal Indians from British Colombia: a serological and PCR analysis. *Clin. diagn. Virol.*, **2**, 67–78
- Delaporte, E., Peeters, M., Simoni, M. & Piot, P. (1989a) HTLV-I infection in western equatorial Africa (Letter to the Editor). *Lancet*, **ii**, 1226

- Delaporte, E., Peeters, M., Durand, J.-P., Dupont, A., Schrijvers, D., Bedjabaga, L., Honoré, C., Ossari, S., Trebucq, A., Josse, R. & Merlin, M. (1989b) Seroepidemiological survey of HTLV-I infection among randomized populations of western central African countries. *J. Acquir. Immune Defic. Syndr.*, **2**, 410–413
- Delaporte, E., Monplaisir, N., Louwagie, J., Peeters, M., Martin-Prével, Y., Louis, J.-P., Trebucq, A., Bedjabaga, L., Ossari, S., Honoré, C., Larouze, B., d'Auriol, L., Van der Goen, G. & Piot, P. (1991) Prevalence of HTLV-I and HTLV-II infection in Gabon, Africa. Comparison of the serological and PCR results. *Int. J. Cancer*, **49**, 373–376
- Delaporte, E., Klotz, F., Peeters, M., Martin-Prevel, Y., Bedjabaga, L., Larouze, B., Nguembi-Mbina, C., Walter, P. & Piot, P. (1993) Non-Hodgkin lymphoma in Gabon and its relation to HTLV-I. *Int. J. Cancer*, **53**, 48–50
- Delaporte, E., Buvé, A., Nzila, N., Goeman, J., Dazza, M.-C., Henzel, D., Heyward, W., St-Louis, M., Piot, P. & Laga, M. (1995) HTLV-I infection among prostitutes and pregnant women in Kinshasa, Zaire: how important is high-risk sexual behavior? *J. Acquir. Immune Defic. Syndr. hum. Retrovirol.*, **8**, 511–515
- Del Mistro, A., Chotard, J., Hall, A.J., Fortuin, M., Whittle, H., De Rossi, A. & Chieco-Bianchi, L. (1994) HTLV-I/II seroprevalence in The Gambia: a study of mother-child pairs. *AIDS Res. hum. Retroviruses*, **10**, 617–620
- Denic, S., Nolan, P., Doherty, J., Garson, J., Tuke, P. & Tedder, R. (1990) HTLV-I infection in Iraq (Letter to the Editor). *Lancet*, **336**, 1135–1136
- Depelchin, A., Letesson, J., Lostrie, N., Mammerickx, M., Portetelle, D. & Burny, A. (1989) Bovine leukemia virus (BLV)-infected B cells express a marker similar to the CD5 T-cell marker. *Immunol. Lett.*, **20**, 69–76
- Dequiedt, F., Kettmann, R., Burny, A. & Willems, L. (1995) Mutations in the p53 tumor-suppressor gene are frequently associated with bovine leukemia virus-induced leukemogenesis in cattle but not in sheep. *Virology*, **209**, 676–683
- Derse, D., Mikovits, J., Polianova, M., Felber, B.K. & Ruscetti, F. (1995) Virions released from cells transfected with a molecular clone of human T-cell leukemia virus type I give rise to primary and secondary infections of T cells. *J. Virol.*, **69**, 1907–1912
- Dezzutti, C.S., Rudolph, D.L., Roberts, C.R. & Lal, R.B. (1993) Characterization of human T-lymphotropic virus type I- and II-infected T-cell lines: antigenic, phenotypic, and genotypic analysis. *Virus Res.*, **29**, 59–70
- Dhib-Jalbut, S., Hoffman, P.M., Yamabe, T., Sun, D., Xia, J., Eisenberg, H., Bergey, G. & Ruscetti, F.W. (1994) Extracellular human T-cell lymphotropic virus type I Tax protein induces cytokine production in adult human microglial cells. *Ann. Neurol.*, **36**, 787–790
- Dimmock, C.K., Ward, W.H. & Trueman, K.F. (1990) Lymphocyte subpopulations in sheep with lymphosarcoma resulting from experimental infection with bovine leukaemia virus. *Immunol. Cell Biol.*, **68**, 45–49
- Dixon, A.C., Yanagihara, E.T., Kwock, D.W. & Nakamura, J.M. (1989) Strongyloidiasis associated with human T-cell lymphotropic virus type I infection in a nonendemic area. *West. J. Med.*, **151**, 410–413
- Djilali, S. & Parodi, A.-L. (1989) The BLV-induced leukemia-lymphosarcoma complex in sheep. *Vet. Immunol. Immunopathol.*, **22**, 233–244

- Djilali, S., Parodi, A.-L., Levy, D. & Cockerell, G.L. (1987) Development of leukemia and lymphosarcoma induced by bovine leukemia virus in sheep. A hematopathological study. *Leukemia*, **1**, 777–781
- Domingues, R.B., Muniz, M.R., Pinho, J.R.R., Bassit, L., Jorge, M.L.C., Saez Alquezar, A., Marchiori, P.E., Chamone, D.F. & Scaff, M. (1995) Human T lymphotropic virus type I-associated myelopathy/tropical spastic paraparesis in São Paulo, Brazil. *Clin. infect. Dis.*, **20**, 1540–1542
- Donegan, E., Lee, H., Operskalski, E.A., Shaw, G.M., Kleinman, S.H., Busch, M.P., Stevens, C.E., Schiff, E.R., Nowicki, M.J., Hollingsworth, C.G., Mosley, J.W. & the Transfusion Safety Study Group (1994) Transfusion transmission of retroviruses: human T-lymphotropic virus types I and II compared with human immunodeficiency virus type 1. *Transfusion*, **34**, 478–483
- Dube, D.K., Sherman, M.P., Saksena, N.K., Bryz-Gornia, V., Mendelson, J., Love, J., Arnold, C.B., Spicer, T., Dube, S., Glaser, J.B., Williams, A.E., Nishimura, M., Jacobsen, S., Ferrer, J.F., Del Pino, N., Quiruelas, S. & Poiesz, B.J. (1993) Genetic heterogeneity in human T-cell leukemia/lymphoma virus type II. *J. Virol.*, **67**, 1175–1184
- Duc Dodon, M., Bernard, A. & Gazzolo, L. (1989) Peripheral T-lymphocyte activation by human T-cell leukemia virus type I interferes with the CD2 but not with the CD3/TCR pathway. *J. Virol.*, **63**, 5413–5419
- Duenas-Barajas, E., Bernal, J.E., Vaught, D.R., Nerurkar, V.R., Sarmiento, P., Yanagihara, R. & Gajdusek, D.C. (1993) Human retroviruses in Amerindians of Colombia: high prevalence of human T cell lymphotropic virus type II infection among the Tunebo Indians. *Am. J. trop. Med. Hyg.*, **49**, 657–663
- Duggan, D.B., Ehrlich, G.D., Davey, F.P., Kwok, S., Sninsky, J., Goldberg, J., Baltrucki, L. & Poiesz, B.J. (1988) HTLV-I-induced lymphoma mimicking Hodgkin's disease. Diagnosis by polymerase chain reaction amplification of specific HTLV-I sequences in tumor DNA. *Blood*, **71**, 1027–1032
- Dumas, M., Houinato, D., Verdier, M., Zohoun, T., Josse, R., Bonis, J., Zohoun, I., Massougboji, A. & Denis, F. (1991) Seroepidemiology of human T-cell lymphotropic virus type I/II in Benin (West Africa). *AIDS Res. hum. Retroviruses*, **7**, 447–451
- Duyao, M.P., Kessler, D.J., Spicer, D.B. & Sonenshein, G.E. (1992) Transactivation of the murine *c-myc* gene by HTLV-I *tax* is mediated by NFκB. *AIDS Res. hum. Retroviruses*, **8**, 752–754
- Eble, B.E., Busch, M.P., Gultinan, A.M., Khayam-Bashi, H. & Murphy, E.L. (1993) Determination of human T lymphotropic virus type by polymerase chain reaction and correlation with risk factors in northern California blood donors. *J. infect. Dis.*, **167**, 954–957
- Edouard, E., Legrand, E., Astier-Gin, T., Dalibart, R., Geoffre, S., Dalbon, P., Guillemain, B. & Londos-Gagliardi, D. (1994) Characterization of monoclonal antibodies directed against the gp46 of human T-cell leukemia virus type I. *Leukemia*, **8** (Suppl. 1), S60–S64
- Eguchi, K., Matsuoka, N., Ida, H., Nakashima, M., Sakai, M., Sakito, S., Kawakami, A., Terada, K., Shimada, H., Kawabe, Y., Fukuda, T., Sawada, T. & Nagataki, S. (1992) Primary Sjögren's syndrome with antibodies to HTLV-I: clinical and laboratory features. *Ann. rheum. Dis.*, **51**, 769–776

- Ehrlich, G.D., Greenberg, S. & Abbott, M.A. (1990) Detection of human T-cell lymphoma/leukemia viruses. In: Innis, M.A., Gelfand, D.H., Sninsky, J.J. & White, T.J., eds, *PCR Protocols: A Guide to Methods and Applications*, San Diego, CA, Academic Press, pp. 324–336
- Eiraku, N., Monken, C., Kubo, T., Zhu, S.W., Rios, M., Bianco, C., Hjelle, B., Nagashima, K. & Hall, W.W. (1995) Nucleotide sequence and restriction fragment length polymorphism analysis of the long terminal repeat of human T-cell leukemia virus type II. *AIDS Res. hum. Retroviruses*, **11**, 625–636
- Eiraku, N., Novoa, P., Da Costa Ferreira, M., Monken, C., Ishak, R., Da Costa Ferreira, O., Zhu, S.W., Lorengo, R., Ishak, M., Azvedo, V., Guerreiro, J., Pombo de Oliveira, M., Loureiro, P., Hammerschlag, N., Ijichi, S. & Hall, W.W. (1996) Identification and characterization of a new and distinct molecular subtype of human T-cell lymphotropic virus type II. *J. Virol.*, **70**, 1481–1492
- El-Farrash, M.A., Badr, M.F., Hawas, S.A., El-Nashar, N.M., Imai, J., Komoda, H. & Hinuma, Y. (1988) Sporadic carriers of human T-lymphotropic virus type I in northern Egypt. *Microbiol. Immunol.*, **32**, 981–984
- Farouqi, B., Yahyaoui, M., Alaoui, F.M., Noraz, N., Sekkat, S., Chkili, T., Desgrange, C. & Benslimane, A. (1992) Establishment of T-lymphoid cell lines from Moroccan patients with tropical spastic paraparesis. *AIDS Res. hum. Retroviruses*, **8**, 1209–1213
- Felber, B.K., Paskalis, H., Kleinman-Ewing, C., Wong-Staal, F. & Pavlakis, G.N. (1985) The pX protein of HTLV-I is a transcriptional activator of its long terminal repeats. *Science*, **229**, 675–679
- Ferreira, O.C., Jr, Vaz, R.S., Carvalho, M.B., Guerra, C., Fabron, A.L., Rosemblyt, J. & Hamerschlag, N. (1995) Human T-lymphotropic virus type I and type II infections and correlation with risk factors in blood donors from São Paulo, Brazil. *Transfusion*, **35**, 258–263
- Feuer, G., Zack, J.A., Harrington, W.J., Jr, Valderama, R., Rosenblatt, J.D., Wachsman, W., Baird, S.M. & Chen, I.S.Y. (1993) Establishment of human T-cell leukemia virus type I T-cell lymphomas in severe combined immunodeficient mice. *Blood*, **82**, 722–731
- Feuer, G., Stewart, S.A., Baird, S.M., Lee, F., Feuer, R. & Chen, I.S.Y. (1995) Potential role of natural killer cells in controlling tumorigenesis by human T-cell leukemia viruses. *J. Virol.*, **69**, 1328–1333
- Figuerola, J.P., Morris, J., Brathwaite, A., Ward, E., Peruga, A., Hayes, R., Vermund, S.H. & Blattner, W. (1995) Risk factors for HTLV-I among heterosexual STD clinic attenders. *J. Acquir. Immune Defic. Syndr. hum. Retrovirol.*, **9**, 81–88
- Foil, L.D. & Issel, C.J. (1991) Transmission of retroviruses by arthropods. *Annu. Rev. Entomol.*, **36**, 355–381
- Fossum, C., Burny, A., Portetelle, D., Mammerickx, M. & Morein, B. (1988) Detection of T and B cells with lectins and antibodies in healthy and bovine leukemia virus-infected cattle. *Vet. Immunol. Immunopathol.*, **18**, 269–278
- Fouchard, N., Flageul, B., Bagot, M., Avril, M.-F., Hermine, O., Sigaux, F., Merle-Beral, H., Troussard, X., Delfraissy, J.-F., de Thé, G. & Gessain, A. (1995) Lack of evidence of HTLV-I/II infection in T CD8 malignant or reactive lymphoproliferative disorders in France: a serological and/or molecular study of 169 cases. *Leukemia*, **9**, 2087–2092

- Foulkes, N.S., Borrelli, E. & Sassone-Corsi, P. (1991) CREM gene: use of alternative DNA-binding domains generates multiple antagonists of cAMP-induced transcription. *Cell*, **64**, 739–749
- Franchini, G. (1995) Molecular mechanisms of human T-cell leukemia/lymphotropic virus type I infection. *Blood*, **86**, 3619–3639
- Franchini, G., Wong-Staal, F. & Gallo, R.C. (1984) Human T-cell leukemia virus (HTLV-I) transcripts in fresh and cultured cells of patients with adult T-cell leukemia. *Proc. natl Acad. Sci. USA*, **81**, 6207–6211
- Franchini, G., Mulloy, J.C., Koralnik, I.J., Lo Menico, A., Sparkowski, J.J., Andresson, T., Goldstein, D.J. & Schlegel, R. (1993) The human T-cell leukemia/lymphotropic virus type I p12¹ protein cooperates with the E5 oncoprotein of bovine papillomavirus in cell transformation and binds the 16-kilodalton subunit of the vacuolar H⁺ ATPase. *J. Virol.*, **67**, 7701–7704
- Franchini, G., Tartaglia, J., Markham, P., Benson, J., Fullen, J., Wills, M., Arp, J., Dekaban, G., Paoletti, E. & Gallo, R.C. (1995) Highly attenuated HTLV type I_{env} poxvirus vaccines induce protection against a cell-associated HTLV type I challenge in rabbits. *AIDS Res. hum. Retroviruses*, **11**, 307–313
- Fréry, N., Chavance, M., Valette, I., Schaffar, L., Neisson-Vernant, C., Jouannelle, J. & Monplaisir, N. (1991) HTLV-I infection in French West Indies: a case-control study. *Eur. J. Epidemiol.*, **7**, 175–182
- Fujihara, K., Du, T.-L., Selkirk, S., Ward, P., Pickert, M., Hohmann, P., Bisaccia, E. & Greenberg, S.J. (1994) A new human endogenous DNA sequence homologous to HTLV-I *pol*. *Genomics*, **22**, 244–246
- Fujii, M., Sassone-Corsi, P. & Verma, I.M. (1988) C-*fos* promoter transactivation by the tax₁ protein of human T-cell leukemia virus type I. *Proc. natl Acad. Sci. USA*, **85**, 8526–8530
- Fujii, M., Niki, T., Mori, T., Matsuda, T., Matsui, M., Nomura, N. & Seiki, M. (1991) HTLV-I Tax induces expression of various immediate early serum response genes. *Oncogene*, **6**, 1023–1029
- Fujii, M., Tsuchiya, H., Chuhjo, T., Akizawa, T. & Seiki, M. (1992) Interaction of HTLV-I Tax1 with p67^{SRF} causes the aberrant induction of cellular immediate early genes through CArG boxes. *Genes Dev.*, **6**, 2066–2076
- Fujino, R., Kawato, K., Ikeda, M., Miyakoshi, H., Mizukoshi, M. & Imai, J. (1991) Improvement of gelatin particle agglutination test for detection of anti-HTLV-I antibody. *Jpn. J. Cancer Res.*, **82**, 367–370
- Fujisawa, J.-I., Seiki, M., Sato, M. & Yoshida, M. (1986) A transcriptional enhancer of HTLV-I is responsible for *trans*-activation mediated by p40^x of HTLV-I. *EMBO J.*, **5**, 713–718
- Fujisawa, J., Seiki, M., Miyatake, S., Arai, K. & Yoshida, M. (1988) Cell-line specific activation of SV40 transcriptional enhancer by p40tax of HTLV-I. *Jpn. J. Cancer Res.*, **79**, 800–804
- Fujita, M. & Shiku, H. (1995) Differences in sensitivity to induction of apoptosis among rat fibroblast cells transformed by HTLV-I *tax* gene or cellular nuclear oncogenes. *Oncogene*, **11**, 15–20
- Fukudome, K., Furuse, M., Fukuhara, N., Orita, S., Imai, T., Takagi, S., Nagira, M., Hinuma, Y. & Yoshie, O. (1992) Strong induction of ICAM-1 in human T-cells transformed by human T-cell-leukemia virus type I and expression of ICAM-1 or LFA-1 in adult T-cell-leukemia-derived cell lines. *Int. J. Cancer*, **52**, 418–427

- Fultz, P.N. (1994) Simian T-lymphotropic virus type I. In: Levy, J.A., ed., *The Retroviridae*, Vol. 3, New York, Plenum Press, pp. 111–131
- Furukawa, K., Furukawa, K. & Shiku, H. (1991) Alternatively spliced mRNA of the *pX* region of human T-lymphotropic virus type I proviral genome. *FEBS Lett.*, **295**, 141–145
- Furukawa, Y., Fujisawa, J., Osame, M., Toita, M., Sonoda, S., Kubota, R., Ijichi, S. & Yoshida, M. (1992) Frequent clonal proliferation of human T-cell leukemia virus type I (HTLV-I)-infected T cells in HTLV-I-associated myelopathy (HAM-TSP). *Blood*, **80**, 1012–1016
- Furukawa, Y., Osame, M., Kubota, R., Tara, M. & Yoshida, M. (1995) Human T-cell leukemia virus type-I (HTLV-I) Tax is expressed at the same level in infected cells of HTLV-I-associated myelopathy or tropical spastic paraparesis patients as in asymptomatic carriers but at a lower level in adult T-cell leukemia cells. *Blood*, **85**, 1865–1870
- Furuta, Y., Aizawa, S., Suda, Y., Ikawa, Y., Kishimoto, H., Asano, Y., Tada, T., Hikikoshi, A., Yoshida, M. & Seiki, M. (1989) Thymic atrophy characteristic in transgenic mice that harbor *pX* genes of human T-cell leukemia virus type I. *J. Virol.*, **63**, 3185–3189
- Gabarre, J., Gessain, A., Raphael, M., Merle-Béral, H., Dubourg, O., Fourcade, C., Gandjbakhch, I., Jault, F., Delcourt, A. & Binet, J.-L. (1993) Adult T-cell leukemia/lymphoma revealed by a surgically cured cardiac valve lymphomatous involvement in an Iranian woman: clinical, immunopathological and viromolecular studies. *Leukemia*, **7**, 1904–1909
- Gabbai, A.A., Bordin, J.O., Vieira-Filho, J.P.B., Kuroda, A., Oliveira, A.S.B., Cruz, M.V., Ribeiro, A.A.F., Delaney, S.R., Henrard, D.R., Rosario, J. & Roman, G.C. (1993) Selectivity of human T lymphotropic virus type-I (HTLV-I) and HTLV-II infection among different populations in Brazil. *Am. J. trop. Med. Hyg.*, **49**, 664–671
- Gallo, D., Penning, L.M. & Hanson, C.V. (1991) Detection and differentiation of antibodies to human T-cell lymphotropic virus types I and II by the immunofluorescence method. *J. clin. Microbiol.*, **29**, 2345–2347
- Gallo, D., Diggs, J.L. & Hanson, C.V. (1994a) Evaluation of two commercial human T-cell lymphotropic virus western blot (immunoblot) kits with problem specimens. *J. clin. Microbiol.*, **32**, 2046–2049
- Gallo, D., Penning, L.M., Diggs, J.L. & Hanson, C.V. (1994b) Sensitivities of radioimmuno-precipitation assay and PCR for detection of human T-lymphotropic type II infection. *J. clin. Microbiol.*, **32**, 2464–2467
- Gallo, R.C. (1995) A surprising advance in the treatment of viral leukemia. *New Engl. J. Med.*, **332**, 1783–1784
- Gallo, R. & Wong-Staal (1990) *Retrovirus Biology and Human Disease*, New York, Marcel Dekker
- Gallo, R.C., Sliski, A. & Wong-Staal, F. (1983) Origin of human T-cell leukaemia-lymphoma virus (Letter to the Editor). *Lancet*, **ii**, 962–963
- Garin, B., Gosselin, S., de Thé, G. & Gessain, A. (1994) HTLV-I/II infection in a high viral endemic area of Zaire, Central Africa: comparative evaluation of serology, PCR, and significance of indeterminate western blot pattern. *J. med. Virol.*, **44**, 104–109
- Garruto, R.M., Slover, M., Yanagihara, R., Mora, C.A., Alexander, S.S., Asher, D.M., Rodgers-Johnson, P. & Gajdusek, D.C. (1990) High prevalence of human T-lymphotropic virus type I infection in isolated populations of the Western Pacific region confirmed by western immunoblot. *Am. J. hum. Biol.*, **2**, 439–447

- Gatei, M.H., Brandon, R., Naif, H.M., Lavin, M.F. & Daniel, R.C.W. (1989) Lymphosarcoma development in sheep experimentally infected with bovine leukaemia virus. *J. vet. Med.*, **B36**, 424–432
- Gatei, M.H., Naif, H.M., Kumar, S., Boyle, D.B., Daniel, R.C.W., Good, M.F. & Lavin, M.F. (1993) Protection of sheep against bovine leukemia virus (BLV) infection by vaccination with recombinant vaccinia viruses expressing BLV envelope glycoproteins: correlation of protection with CD4 T-cell response to gp51 peptide 51–70. *J. Virol.*, **67**, 1803–1810
- Gazzolo, L. & Duc Dodon, M. (1987) Direct activation of resting T lymphocytes by human T-lymphotropic virus type I. *Nature*, **326**, 714–717
- Gelderblom, H.R. (1991) Assembly and morphology of HIV: potential effect of structure on viral function. *AIDS*, **5**, 617–637
- Gérard, Y., Lepere, J.-F., Pradinaud, R., Joly, F., Lepelletier, L., Joubert, M., Sainte Marie, D., Mahieux, R., Ureta Vidal, A., Larregain-Fournier, D., Valensi, F., Moynet, D., de Thé, G., Guillemain, B., Moreau, J.-P. & Gessain, A. (1995) Clustering and clinical diversity of adult T-cell leukemia/lymphoma associated with HTLV-I in a remote black population of French Guiana. *Int. J. Cancer*, **60**, 773–776
- Gessain, A. & Gout, O. (1992) Chronic myelopathy associated with human T-lymphotropic virus type-I (HTLV-I). *Ann. intern. Med.*, **117**, 933–946
- Gessain, A. & Mathieux, R. (1995) HTLV-I 'indeterminate' western blot patterns observed in sera from tropical regions: the situation revisited. *J. acquir. Immune Defic. Syndr. hum. Retrovirol.*, **9**, 316–319
- Gessain, A. & de Thé, G. (1996) What is the situation of human T cell lymphotropic virus type II (HTLV-II) in Africa ? Origin and dissemination of genomic subtypes. *J. acquir. Immune Defic. Syndr. hum. Retrovirol.* (in press)
- Gessain, A., Calender, A., Strobel, M., Lefait-Robin, R. & de Thé, G. (1984) High prevalence of antiHTLV-I antibodies in the Boni, an ethnic group of African origin isolated in French Guiana since the 18th century. *C. R. Acad. Sci. Paris III*, **299**, 351–353 (in French)
- Gessain, A., Barin, F., Vernant, J.-C., Gout, O., Maurs, L., Calender, A. & de Thé, G. (1985) Antibody to human T-lymphotropic virus type-I in patients with tropical spastic paraparesis. *Lancet*, **ii**, 407–409
- Gessain, A., Caudie, C., Gout, O., Vernant, J.-C., Maurs, L., Giordano, C., Malone, G., Tournier-Lasserre, E., Essex, M. & de Thé, G. (1988) Intrathecal synthesis of antibodies to human T lymphotropic virus type I and the presence of IgG oligoclonal bands in the cerebrospinal fluid of patients with endemic tropical spastic paraparesis. *J. infect. Dis.*, **157**, 1226–1234
- Gessain, A., Saal, F., Gout, O., Daniel, M.-T., Landrin, G., de Thé, G., Périès, J. & Sigaux, F. (1990a) High human T-cell lymphotropic virus type I proviral DNA load with polyclonal integration in peripheral blood mononuclear cells of French West Indian, Guianese, and African patients with tropical spastic paraparesis. *Blood*, **75**, 428–433
- Gessain, A., Saal, F., Iron, M.-L., Lasneret, J., Lagaye, S., Gout, O., de Thé, G., Sigaux, F. & Périès, J. (1990b) Cell surface phenotype and human T lymphotropic virus type I antigen expression in 12 T cell lines derived from peripheral blood and cerebrospinal fluid of West Indian, Guyanese and African patients with tropical spastic paraparesis. *J. gen. Virol.*, **71**, 333–341

- Gessain, A., Louie, A., Gout, O., Gallo, R.C. & Franchini, G. (1991) Human T-cell leukemia-lymphoma virus type I (HTLV-I) expression in fresh peripheral blood mononuclear cells from patients with tropical spastic paraparesis/HTLV-I-associated myelopathy. *J. Virol.*, **65**, 1628–1633
- Gessain, A., Gallo, R.C. & Franchini, G. (1992a) Low degree of human T-cell leukemia-lymphoma virus type I genetic drift *in vivo* as a means of monitoring viral transmission and movement of ancient human populations. *J. Virol.*, **66**, 2288–2295
- Gessain, A., Caumes, E., Feyeux, C., d'Agay, M.F., Capesius, C., Gentilini, M. & Morel, P. (1992b) The cutaneous form of adult T-cell leukemia/lymphoma in a woman from the Ivory Coast. Clinical, immunovirologic studies and a review of the African adult T-cell leukemia-lymphoma cases. *Cancer*, **69**, 1362–1367
- Gessain, A., Boeri, E., Yanagihara, R., Gallo, R.C. & Franchini, G. (1993) Complete nucleotide sequence of a highly divergent human T-cell leukemia (lymphotropic) virus type I (HTLV-I) variant from Melanesia: genetic and phylogenetic relationship to HTLV-I strains from other geographical regions. *J. Virol.*, **67**, 1015–1023
- Gessain, A., Maucière, P., Froment, A., Biglione, M., Le Hesran, J.Y., Tekai, F., Millan, J. & de Thé, G. (1995a) Isolation and molecular characterization of a human T-cell lymphotropic virus type II (HTLV-II), subtype B, from a healthy Pygmy living in a remote area of Cameroon: an ancient origin for HTLV-II in Africa. *Proc. natl Acad. Sci. USA*, **92**, 4041–4045
- Gessain, A., Mahieux, R. & de Thé, G. (1995b) HTLV-I 'indeterminate' western blot patterns observed in sera from tropical regions: the situation revisited (Letter to the Editor). *J. Acquir. Immune Defic. Syndr. hum. Retrovirol.*, **9**, 316–317
- Gessain, A., Malet, C., Robert-Lamblin, J., Lepère, A., David, P., Chichlo, B., Sousova, O., Stepina, V., Gurtsevitch, V., Tortevoeye, P., Hubert, A. & de Thé, G. (1996a) Serological evidence of HTLV-I but not HTLV-II infection in ethnic groups of northern and eastern Siberia. *J. Acquir. Immune Defic. Syndr. hum. Retrovirol.*, **11**, 413–414
- Gessain, A., Mahieux, R. & de Thé, G. (1996b) Genetic variability and molecular epidemiology of human and simian T cell leukemia/lymphoma virus type I. *J. Acquir. Immune Defic. Syndr. hum. Retrovirol.* (in press)
- Gibbs, W.N., Lofters, W.S., Campbell, M., Hanchard, B., LaGrenade, L., Cranston, B., Hendriks, J., Jaffe, E.S., Saxinger, C., Robert-Guroff, M., Gallo, R.C., Clark, J. & Blattner, W.A. (1987) Non-Hodgkin lymphoma in Jamaica and its relation to adult T-cell leukemia-lymphoma. *Ann. intern. Med.*, **106**, 361–368
- Gill, P.S., Harrington, W., Jr, Kaplan, M.H., Ribeiro, R.C., Bennett, J.M., Liebman, H.A., Bernstein-Singer, M., Espina, B.M., Cabral, L., Allen, S., Kornblau, S., Pike, M.C. & Levine, A.M. (1995) Treatment of adult T-cell leukemia-lymphoma with a combination of interferon alfa and zidovudine. *New Engl. J. Med.*, **332**, 1744–1748
- Giri, A., Markham, P., Digilio, L., Hurteau, G., Gallo, R.C. & Franchini, G. (1994) Isolation of a novel simian T-cell lymphotropic virus from *Pan paniscus* that is distantly related to the human T-cell leukemia/lymphotropic virus types I and II. *J. Virol.*, **68**, 8392–8395
- Gitlin, S.D., Bosselut, R., Gégonne, A., Ghysdael, J. & Brady, J.N. (1991) Sequence-specific interaction of the Ets1 protein with the long terminal repeat of the human T-lymphotropic virus type I. *J. Virol.*, **65**, 5513–5523

- Gitlin, S.D., Dittmer, J., Reid, R.L. & Brady, J.N. (1993) The molecular biology of human T-cell leukemia viruses. In: Cullen, B., ed., *Frontiers in Molecular Biology*, Oxford, Oxford University Press, pp. 159–192
- Goldstein, D.J., Finbow, M.E., Andresson, T., McLean, P., Smith, K., Bubb, V. & Schlegel, R. (1991) The bovine papillomavirus E5 oncoprotein binds to the 16 kilodalton component of vacuolar H⁺-ATPases. *Nature*, **352**, 347–349
- Goldstein, D.J., Li, W., Wang, L.-M., Heidaran, M.A., Aaronson, S., Shinn, R., Schlegel, R. & Pierce, J.H. (1994) The bovine papillomavirus type 1 E5 transforming protein specifically binds and activates the β -type receptor for the platelet-derived growth factor but not other related tyrosine kinase-containing receptors to induce cellular transformation. *J. Virol.*, **68**, 4432–4441
- Gotuzzo, E., Sánchez, J., Escamilla, J., Carrillo, C., Phillips, I.A., Moreyra, L., Stamm, W., Ashley, R., Roggen, E.L., Kreiss, J., Piot, P. & Holmes, K.K. (1994) Human T cell lymphotropic virus type I infection among female sex workers in Peru. *J. infect. Dis.*, **169**, 754–759
- Goubau, P., Carton, H., Kazadi, K., Muya, K.W. & Desmyter, J. (1990) HTLV seroepidemiology in a central African population with high incidence of tropical spastic paraparesis. *Trans. R. Soc. trop. Med. Hyg.*, **84**, 577–579
- Goubau, P., Desmyter, J., Ghesquiere, J. & Kasereka, B. (1992) HTLV-II among pygmies (Letter to the Editor). *Nature*, **359**, 201
- Goubau, P., Desmyter, J., Swanson, P., Reynders, M., Shih, J., Surmont, I., Kazadi, K. & Lee, H. (1993a) Detection of HTLV-I and HTLV-II infection in Africans using type-specific envelope peptides. *J. med. Virol.*, **39**, 28–32
- Goubau, P., Liu, H.-F., De Lange, G.G., Vandamme, A.-M. & Desmyter, J. (1993b) HTLV-II seroprevalence in Pygmies across Africa since 1970. *AIDS Res. hum. Retroviruses*, **9**, 709–713
- Goubau, P., Van Brussel, M., Vandamme, A.-M., Liu, H.-F. & Desmyter, J. (1994) A primate T-lymphotropic virus, PTLV-L, different from human T-lymphotropic viruses types I and II, in a wild-caught baboon (*Papio hamadryas*). *Proc. natl Acad. Sci. USA*, **91**, 2848–2852
- Gout, O., Baulac, M., Gessain, A., Semah, F., Saal, F., Périès, J., Cabrol, C., Foucault-Fretz, C., Laplane, D., Sigaux, F. & de Thé, G. (1990) Rapid development of myelopathy after HTLV-I infection acquired by transfusion during cardiac transplantation. *New Eng. J. Med.*, **322**, 383–388
- Grassmann, R., Dengler, C., Müller-Fleckenstein, I., Fleckenstein, B., McGuire, K., Dokhelar, M.-C., Sodroski, J.G. & Haseltine, W.A. (1989) Transformation to continuous growth of primary human T-lymphocytes by human T-cell leukemia virus type I X-region genes transduced by a *Herpesvirus saimiri* vector. *Proc. natl Acad. Sci. USA*, **86**, 3351–3355
- Grassmann, R., Berchtold, S., Radant, I., Alt, M., Fleckenstein, B., Sodroski, J.G., Haseltine, W.A. & Ramstedt, U. (1992) Role of human T-cell leukemia virus type I X region proteins in immortalization of primary human T-lymphocytes in culture. *J. Virol.*, **66**, 4570–4575
- Green, J.E. (1991) *trans* Activation of nerve growth factor in transgenic mice containing the human T-cell lymphotropic virus type I *tax* gene. *Mol. cell. Biol.*, **11**, 4635–4641
- Green, J.E., Hinrichs, S.H., Vogel, J. & Jay, G. (1989a) Exocrinopathy resembling Sjögren's syndrome in HTLV-1 *tax* transgenic mice. *Nature*, **341**, 72–74

- Green, J.E., Begley, C.G., Wagner, D. K., Waldmann, T.A. & Jay, G. (1989b) *trans* Activation of granulocyte-macrophage colony-stimulating factor and the interleukin-2 receptor in transgenic mice carrying the human T-lymphotropic virus type I *tax* gene. *Mol. cell. Biol.*, **9**, 4731–4737
- Green, J.E., Baird, A.M., Hinrichs, S.H., Klintworth, G.K. & Jay, G. (1992) Adrenal medullary tumors and iris proliferation in a transgenic mouse model of neurofibromatosis. *Am. J. Pathol.*, **140**, 1401–1410
- Green, P.L., Ross, T.M., Chen, I.S.Y. & Pettiford, S. (1995) Human T-cell leukemia virus type II nucleotide sequences between *env* and the last exon of *tax/rex* are not required for viral replication or cellular transformation. *J. Virol.*, **69**, 387–394
- Greenberg, S.J., Jaffe, E.S., Ehrlich, G.D., Korman, N.J., Poiesz, B.J. & Waldmann, T.A. (1990) Kaposi's sarcoma in human T-cell leukemia virus type I-associated adult T-cell leukemia. *Blood*, **76**, 971–976
- Grégoire, D., Couez, D., Deschamps, J., Heuertz, S., Hors-Cayla, M.-C., Szpirer, J., Szpirer, C., Burny, A., Huez, G. & Kettmann, R. (1984) Different bovine leukemia virus-induced tumors harbor the provirus in different chromosomes. *J. Virol.*, **50**, 275–279
- Grossman, B., Schechter, G.P., Horton, J.E., Pierce, L., Jaffe, E. & Whal, L. (1981) Hypercalcaemia associated with T-cell lymphoma-leukemia. *Am. J. clin. Pathol.*, **75**, 149–155
- Grossman, W.J., Kimata, J.T., Wong, F.-H., Zutter, M., Ley, T.J. & Ratner, L. (1995) Development of leukemia in mice transgenic for the *tax* gene of human T-cell leukemia virus type I. *Proc. natl Acad. Sci. USA*, **92**, 1057–1061
- Guerena-Burgueno, F., Benenson, A.S., Sepulveda-Amor, J., Ascher, M.S., Vugia, D.J. & Gallo, D. (1992) Prevalence of human T cell lymphotropic virus types I and II (HTLV-I/II) in selected Tijuana subpopulations. *Am. J. trop. Med. Hyg.*, **47**, 127–132
- Gurtsevitch, V., Senyuta, N., Shih, J., Stepina, V., Pavlish, O., Syrtsev, A., Susova, O., Yakovleva, L., Scherbak, L. & Hayami, M. (1995) HTLV-I infection among Nivkhi people in Sakhalin (Letter to the Editor). *Int. J. Cancer*, **60**, 432–433
- Gutfraind, Z., Blejer, J.L., Saguier, M.C., Gomez Carretero, M.L., Pirola, D.A. & Carreras Vescio, L.A. (1994) Seroprevalence of HTLV-I/HTLV-II in blood donors in Buenos Aires (Argentina) (Letter to the Editor). *Vox Sang.*, **67**, 408–409
- Hadlock, K.G., Lipka, J.J., Chow, T.P., Fong, S.K.H. & Reyes, G.R. (1992) Cloning and analysis of a recombinant antigen containing an epitope specific for human T-cell lymphotropic virus type II. *Blood*, **79**, 2789–2796
- Hadlock, K.G., Goh, C.-J., Bradshaw, P.A., Perkins, S., Lo, J., Kaplan, J.E., Khabbaz, R. & Fong, S.K.H. (1995) Delineation of an immunodominant and human T-cell lymphotropic virus (HTLV)-specific epitope within the HTLV-I transmembrane glycoprotein. *Blood*, **86**, 1392–1399
- Hahn, B.H., Shaw, G.M., Popovic, M., Lo Monaco, A., Gallo, R.C. & Wong-Staal, F. (1984) Molecular cloning and analysis of a new variant of human T-cell leukemia virus (HTLV-Ib) from an African patient with adult T-cell leukemia-lymphoma. *Int. J. Cancer*, **34**, 613–618
- Hai, T., Liu, F., Coukos, W.J. & Green, M.R. (1989) Transcription factor ATF cDNA clones: an extensive family of leucine zipper proteins able to selectively form DNA-binding heterodimers. *Genes Dev.*, **3**, 2083–2090
- Hall, W.W., Liu, C.R., Schneewind, O., Takahashi, H., Kaplan, M.H., Röupe, G. & Vahlne, A. (1991) Deleted HTLV-I provirus in blood and cutaneous lesions of patients with mycosis fungoides. *Science*, **253**, 317–320

- Hall, W.W., Takahashi, H., Liu, C., Kaplan, M.H., Scheewind, O., Ijichi, S., Nagashima, K. & Gallo, R.C. (1992) Multiple isolates and characteristics of human T-cell leukemia virus type II. *J. Virol.*, **66**, 2456–2463
- Hall, W.W., Kubo, T., Ijichi, S., Takahashi, H. & Zhu, S.W. (1994) Human T-cell leukemia/lymphoma virus, type II (HTLV-II): emergence of an important newly recognized pathogen. *Sem. Virol.*, **5**, 165–178
- Hall, W.W., Zhu, S.W., Novoa, P., Eiraku, N., Ishak, R., Ferreira, M.C., Acevedo, V., Ishak, M., Guerreiro, J.F., Ferreira, O.C., Monken, C. & Kurata, T. (1996) Human T lymphotropic virus, type II (HTLV-II): epidemiology, molecular properties and clinical features of infection. *J. Acquir. Immune Defic. Syndr. Hum. Retrovirol.* (in press)
- Hanchard, B., LaGrenade, L., Carberry, C., Fletcher, V., Williams, E., Cranston, B., Blattner, W.A. & Manns, A. (1991) Childhood infective dermatitis evolving into adult T-cell leukaemia after 17 years (Letter to the Editor). *Lancet*, **ii**, 1593–1594
- Hanly, S.M., Rimsky, L.T., Malim, M.H., Kim, J.H., Hauber, J., Duc Dodon, M., Le, S.-Y., Maizel, J.V., Cullen, B.R. & Greene, W.C. (1989) Comparative analysis of the HTLV-I Rex and HIV-1 Rev *trans*-regulatory proteins and their RNA response elements. *Genes Dev.*, **3**, 1534–1544
- Harper, M.E., Kaplan, M.H., Marselle, L.M., Pahwa, S.G., Chayt, K.J., Sarngadharan, M.G., Wong-Staal, F. & Gallo, R.C. (1986) Concomitant infection with HTLV-I and HTLV-III in a patient with T8 lymphoproliferative disease. *New Engl. J. Med.*, **315**, 1073–1078
- Harrington, W.J., Jr, Sheremata, W., Hjelle, B., Dube, D.K., Bradshaw, P., Fount, S.K., Snodgrass, S., Toedter, G., Cabral, L. & Poiesz, B. (1993) Spastic ataxia associated with human T-cell lymphotropic virus type II infection. *Ann. Neurol.*, **33**, 411–414
- Harrington, W.J., Jr, Ucar, A., Gill, P., Snodgrass, S., Sheremata, W., Cabral, L., Rabin, M., Byrne, G.E., Jr, Berger, J., Voight, W., Kemper, R., Miller, G., Whitcomb, C.C., Greenberg, A., Byrnes, J.J. & Poiesz, B. (1995) Clinical spectrum of HTLV-I in South Florida. *J. Acquir. Immune Defic. Syndr. Hum. Retrovirol.*, **8**, 466–473
- Hatta, Y., Hiramata, T., Miller, C.W., Yamada, Y., Tomonaga, M. & Koeffler, H.P. (1995) Homozygous deletions of the p15 (MTS2) and p16 (CDKN2/MTS1) genes in adult T-cell leukemia. *Blood*, **85**, 2699–2704
- Hattori, T., Asou, N., Suzushima, H., Takatsuki, K., Tanaka, K., Naito, K., Natori, H. & Oizumi, K. (1991) Leukaemia of novel gastrointestinal T-lymphocyte population infected with HTLV-I. *Lancet*, **337**, 76–77
- Hayami, M., Komuro, A., Nozawa, K., Shotake, T., Ishikawa, K.I., Yamamoto, K., Ishida, T., Honjo, S. & Hinuma, Y. (1984) Prevalence of antibody to adult T-cell leukemia virus-associated antigens (ATLA) in Japanese monkeys and other non-human primates. *Int. J. Cancer*, **33**, 179–183
- Heeney, J.L. & Valli, V.E.O. (1990) Transformed phenotype of enzootic bovine lymphoma reflects differentiation-linked leukemogenesis. *Lab. Invest.*, **62**, 339–346
- Heneine, W., Kaplan, J.E., Gracia, F., Lal, R., Roberts, B., Levine, P.H. & Reeves, W.C. (1991) HTLV-II endemicity among Guaymí Indians in Panama (Letter to the Editor). *New Engl. J. Med.*, **324**, 565
- Heneine, W., Chan, W.C., Lust, J.A., Sinha, S.D., Zaki, S.R., Khabbaz, R.F. & Kaplan, J.E. (1994) HTLV-II infection is rare in patients with large granular lymphocyte leukemia (Letter to the Editor). *J. Acquir. Immune Defic. Syndr.*, **7**, 736–737

- Henrard, D.R., Soriano, V., Robertson, E., Gutierrez, M., Stephens, J., Dronda, F., Miles, F., Pujol, E., Buytendorp, M., Castro, A., Chan, E., Vallejo, A., Llibre, J., Motley, C., Prillaman, J. & the HTLV-I and HTLV-II Spanish Study Group (1995) Prevalence of human T-cell lymphotropic virus type I (HTLV-I) and HTLV-II infection among Spanish drug users measured by HTLV-I assay and HTLV-I and -II assay. *J. clin. Microbiol.*, **33**, 1735–1738
- Hermine, O., Bouscary, D., Gessain, A., Turlure, P., Leblond, V., Franck, N., Buzyn-Veil, A., Rio, B., Macintyre, E., Dreyfus, F. & Bazarbachi, A. (1995) Brief report: treatment of adult T-cell leukemia-lymphoma with zidovudine and interferon alfa. *New Engl. J. Med.*, **332**, 1749–1751
- Hidaka, M., Inoue, J., Yoshida, M. & Seiki, M. (1988) Post-transcriptional regulator (*rex*) of HTLV-I initiates expression of viral structural proteins but suppresses expression of regulatory proteins. *EMBO J.*, **7**, 519–523
- Higuchi, I., Nerenberg, M., Yoshimine, K., Yoshida, M., Fukunaka, H., Tajima, K. & Osame, M. (1992) Failure to detect HTLV-I by in situ hybridization in the biopsied muscles of viral carriers with polymyositis. *Muscle Nerve*, **15**, 43–47
- Hino, S. (1990a) Maternal-infant transmission of HTLV-I—Implication for disease. In: Blattner, W.A., ed., *Human Retrovirology: HTLV*, New York, Raven Press, pp. 363–375
- Hino, S. (1990b) Milk-borne transmission of HTLV-I from carrier mothers and its prevention. *Hematol. Rev.*, **3**, 223–233
- Hino, S., Kinoshita, K. & Kitamura, T. (1984) HTLV and the propagation of christianity in Nagasaki (Letter to the Editor). *Lancet*, **ii**, 572–573
- Hino, S., Sugiyama, H., Doi, H., Ishimaru, T., Yamabe, T., Tsuji, Y. & Miyamoto, T. (1987a) Breaking the cycle of HTLV-I transmission via carrier mothers' milk (Letter to the Editor). *Lancet*, **ii**, 158–159
- Hino, S., Doi, H., Yoshikuni, H., Sugiyama, H., Ishimaru, T., Yamabe, T., Tsuji, Y. & Miyamoto, T. (1987b) HTLV-I carrier mothers with high-titer antibody are at high risk as a source of infection. *Jpn. J. Cancer Res. (Gann)*, **78**, 1156–1158
- Hino, S., Katamine, S., Kawase, K.-I., Miyamoto, T., Doi, H., Tsuji, Y. & Yamabe, T. (1994) Intervention of maternal transmission of HTLV-I in Nagasaki, Japan. *Leukemia*, **8** (Suppl. 1), S68–S70
- Hinrichs, S.H., Nerenberg, M., Reynolds, R.K., Khoury, G. & Jay, G. (1987) A transgenic mouse model for human neurofibromatosis. *Science*, **237**, 1340–1343
- Hinuma, Y. (1986) Seroepidemiology of adult T-cell leukemia virus (HTLV-I/ATLV): origin of virus carriers in Japan. *AIDS Res.*, **2** (Suppl. 1), S17–S22
- Hinuma, Y., Komoda, H., Chosa, T., Kondo, T., Kohakura, M., Takenaka, T., Kikuchi, M., Ichimaru, M., Yunoki, K., Sato, I., Matsuo, R., Takiuchi, Y., Uchino, H. & Hanaoka, M. (1982) Antibodies to adult T-cell leukemia-virus-associated antigen (ATLA) in sera from patients with ATL and controls in Japan: a nation-wide sero-epidemiologic study. *Int. J. Cancer*, **29**, 631–635
- Hirai, H., Suzuki, T., Fujisawa, J.-I., Inoue, J.-I. & Yoshida, M. (1994) Tax protein of human T-cell leukemia virus type I binds to the ankyrin motifs of inhibitory factor κ B and induces nuclear translocation of transcription factor NF- κ B proteins for transcriptional activation. *Proc. natl Acad. Sci. USA*, **91**, 3584–3588

- Hjelle, B., Appenzeller, O., Mills, R., Alexander, S., Torrez-Martinez, N., Jahnke, R. & Ross, G. (1992) Chronic neurodegenerative disease associated with HTLV-II infection. *Lancet*, **339**, 645–646
- Hjelle, B., Wilson, C., Cyrus, S., Bradshaw, P., Lo, J., Schammel, C., Wiltbank, T. & Alexander, S. (1993) Human T-cell leukemia virus type II infection frequently goes undetected in contemporary US blood donors. *Blood*, **81**, 1641–1644
- Hoffman, P.M., Dhib-Jalbut, S., Mikovits, J.A., Robbins, D.S., Wolf, A.L., Bergey, G.K., Lohrey, N.C., Weislow, O.S. & Ruscetti, F.W. (1992) Human T-cell leukemia virus type I infection of monocytes and microglial cells in primary human cultures. *Proc. natl Acad. Sci. USA*, **89**, 11784–11788
- Höllsberg, P., Wucherpfennig, K.W., Ausubel, L.J., Calvo, V., Bierer, B.E. & Hafler, D.A. (1992) Characterization of HTLV-I in vivo infected T cell clones: IL-2-independent growth of nontransformed T-cells. *J. Immunol.*, **148**, 3256–3263
- Homma, T., Kanki, P.J., King, N.W., Jr, Hunt, R.D., O'Connell, M.J., Letvin, N.L., Daniel, M.D., Desrosiers, R.C., Yang, C.S. & Essex, M. (1984) Lymphoma in macaques: association with virus of human T lymphotropic family. *Science*, **225**, 716–718
- Honda, S., Yamaguchi, K., Miyake, Y., Hayashi, N., Adachi, N., Kinoshita, K.-I., Ikehara, O., Kimura, S., Kinoshita, T., Shimotohno, K., Shimoyama, M. & Abe, K. (1988) Production of parathyroid hormone-related protein in adult T-cell leukemia cells. *Jpn. J. Cancer Res. (Gann)*, **79**, 1264–1268
- Hori, M., Ami, Y., Kushida, S., Kobayashi, M., Uchida, K., Abe, T. & Miwa, M. (1995) Intra-uterine transmission of human T-cell leukemia virus type I in rats. *J. Virol.*, **69**, 1302–1305
- The HTLV European Research Network (1996) Seroepidemiology of the human T-cell leukemia/lymphoma viruses in Europe. *J. acquir. Immune Defic. Syndr. hum. Retrovirol.*, **13**, 68–77
- Hubbard, G.B., Monè, J.P., Allan, J.S., Davis, K.J., III, Leland, M.M., Banks, P.M. & Smir, B. (1993) Spontaneously generated non-Hodgkin's lymphoma in twenty-seven simian T-cell leukemia virus type I antibody-positive baboons (*Papio* species). *Lab. Anim. Sci.*, **43**, 301–309
- Hunsmann, G., Bayer, H., Schneider, J., Schmitz, H., Kern, P., Dietrich, M., Büttner, D.W., Goudeau, A.M., Kulkarni, G. & Fleming, A.F. (1984) Antibodies to ATL/HTLV-I in Africa. *Med. Microbiol. Immunol.*, **173**, 167–170
- IARC (1994) *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*, Vol. 59, *Hepatitis Viruses*, Lyon
- IARC (1995) *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*, Vol. 64, *Human Papillomaviruses*, Lyon
- Ibrahim, F., Fiette, L., Gessain, A., Buisson, N., de Thé, G. & Bomford, R. (1994) Infection of rats with human T-cell leukemia virus type-I: susceptibility of inbred strains, antibody response and provirus location. *Int. J. Cancer*, **58**, 446–451
- Ichimaru, M., Kinoshita, K., Kamihira, S., Ikeda, S., Yamada, Y. & Amagasaki, T. (1979) T-cell malignant lymphoma in Nagasaki district and its problems. *Jpn. J. clin. Oncol.*, **9** (Suppl.), 337–346
- Iida, S., Fujiyama, S., Yosida, K., Morishita, T., Shibata, J., Sato, T. & Nishimura, Y. (1988) The seroprevalence of anti-HTLV-I antibodies in patients with various liver diseases. *Hepato-gastroenterology*, **35**, 242–244

- Ijichi, S., Matsuda, T., Maruyama, I., Izumihara, T., Kojima, K., Niimura, T., Maruyama, Y., Sonoda, S., Yoshida, A. & Osame, M. (1990) Arthritis in a human T-lymphotropic virus type I (HTLV-I) carrier. *Ann. rheum. Dis.*, **49**, 718–721
- Ikeda, M., Fujino, R., Matsui, T., Yoshida, T., Komoda, H. & Imai, J. (1984) A new agglutination test for serum antibodies to adult T-cell leukemia virus. *Gann*, **75**, 845–848
- Ikeda, S., Momita, S., Amagasaki, T., Tsukasaki, K., Yamada, Y., Kusumoto, Y., Ito, M., Kanda, N., Tomonaga, M., Soda, H., Atogami, S., Kamihara, S., Hino, S., Ito, S.-I., Kinoshita, K. & Ichimaru, M. (1990) Detection of preleukemic state of adult T-cell leukemia (pre-ATL) in HTLV-I carriers. *Cancer Detect. Prev.*, **14**, 431–435
- Imada, K., Takaori-Kondo, A., Akagi, T., Shimotohno, K., Sugamura, K., Hattori, T., Yamabe, H., Okuma, M. & Uchiyama, T. (1995) Tumorigenicity of human T-cell leukemia virus type I-infected cell lines in severe combined immunodeficient mice and characterization of the cells proliferating *in vivo*. *Blood*, **86**, 2350–2357
- Imai, T., Tanaka, Y., Fukudome, K., Takagi, S., Araki, K., Yoshie, O. (1993) Enhanced expression of LFA-3 on human T-cell lines and leukemic cells carrying human T-cell leukemia virus type I. *Int. J. Cancer*, **55**, 811–816
- Imajo, K., Shinagawa, K., Tada, S., Tsubota, T. & Kimura, I. (1993) Detection of the *pX* gene of human T-lymphotropic virus type I in respiratory diseases with diffuse interstitial pulmonary shadows and lung cancer. *Acta med. Okayama*, **47**, 363–368
- Imamura, N., Inada, T., Tagaya, Y., Yodoi, J. & Kuramoto, A. (1993) Association between ATL and non-hematopoietic neoplasms. *Hematol. Oncol.*, **11**, 127–137
- Inaba, S., Sato, H., Okochi, K., Fukada, K., Takakura, F., Tokunaga, K., Kiyokawa, H. & Maeda, Y. (1989) Prevention of transmission of human T-lymphotropic virus type I (HTLV-I) through transfusion, by donor screening with antibody to the virus. One-year experience. *Transfusion*, **29**, 7–11
- Inoue, J.-I., Seiki, M., Taniguchi, T., Tsuru, S. & Yoshida, M. (1986) Induction of interleukin 2 receptor gene expression by p40^l encoded by human T-cell leukemia virus type I. *EMBO J.*, **5**, 2883–2888
- Inoue, J.-I., Itoh, M., Akizawa, T., Toyoshima, H. & Yoshida, M. (1991) HTLV-I Rex protein accumulates unspliced RNA in the nucleus as well as in cytoplasm. *Oncogene*, **6**, 1753–1757
- Inoue, Y., Fujii, T., Ohtsubo, T., Mori, N., Ishino, T., Hisano, H., Kaku, M., Koga, H., Kohno, S., Hara, K., Ayabe, H., Mukae, H. & Tomita, H. (1994a) A case of HTLV-I carrier associated with pulmonary cryptococcosis and thymoma. *Nippon Kyobu Shikkan Gakkai Zasshi*, **32**, 778–784 (in Japanese)
- Inoue, H., Yamaoka, S., Imamura, M. & Hatanaka, M. (1994b) Suppression of the transformed phenotype in hybrids of human T-cell leukemia virus type I Tax-transformed rat fibroblasts and normal human fibroblasts. *Exp. Cell Res.*, **215**, 68–74
- International Committee on Bovine Leukosis (1968) Criteria for the determination of the normal and leukotic state in cattle. *J. natl Cancer Inst.*, **41**, 243–251
- Ishida, T., Yamamoto, K., Omoto, K., Iwanaga, M., Osato, T. & Hinuma, Y. (1985) Prevalence of a human retrovirus in native Japanese: evidence for a possible ancient origin. *J. Infect.*, **11**, 153–157
- Ishida, T., Yamamoto, K. & Omoto, K. (1988) A seroepidemiological survey of HTLV-I in the Philippines. *Int. J. Epidemiol.*, **17**, 625–628

- Ishida, T., Takayanagi, K.-I., Shotake, T., Hirai, K. & Yuasa, I. (1992) A seroepidemiological study of HTLV-I infection in Nepal. *Scand. J. infect. Dis.*, **24**, 399–400
- Ishihara, S., Tachibana, N., Okayama, A., Murai, K., Tsuda, K. & Mueller, N. (1992) Successful graft of HTLV-I-transformed human T-cells (MT-2) in severe combined immunodeficiency mice treated with anti-asiolo GM-1 antibody. *Jpn. J. Cancer Res.*, **83**, 320–323
- Ishihara, S., Okayama, A., Stuver, S., Horinouchi, H., Shioiri, S., Murai, K., Kubota, T., Yamashita, R., Tachibana, N., Tsubouchi, H. & Mueller, N. (1994) Association of HTLV-I antibody profile of asymptomatic carriers with proviral DNA levels of peripheral blood mononuclear cells. *J. acquir. Immune Defic. Syndr.*, **7**, 199–203
- Ishikawa, K.-I., Fukasawa, M., Tsujimoto, H., Else, J.G., Isahakia, M., Ubhi, N.K., Ishida, T., Takenaka, O., Kawamoto, Y., Shotake, T., Ohsawa, H., Ivanoff, B., Cooper, R.W., Frost, E., Grant, F.C., Spriatna, Y., Sutarman, Y., Abe, K., Yamamoto, K. & Hayami, M. (1987) Serological survey and virus isolation of simian T-cell leukemia/T-lymphotropic virus type I (STLV-I) in non-human primates in their native countries. *Int. J. Cancer*, **40**, 233–239
- Itoyama, Y., Minato, S., Kira, J.-I., Goto, I., Sato, H., Okochi, K. & Yamamoto, N. (1988) Spontaneous proliferation of peripheral blood lymphocytes increased in patients with HTLV-I associated myelopathy. *Neurology*, **38**, 1302–1307
- Iwahara, Y., Takehara, N., Kataoka, R., Sawada, T., Ohtsuki, Y., Nakachi, H., Maehama, T., Okayama, T. & Miyoshi, I. (1990) Transmission of HTLV-I to rabbits via semen and breast milk from seropositive healthy persons. *Int. J. Cancer*, **45**, 980–983
- Iwakura, Y., Tosu, M., Yoshida, E., Takiguchi, M., Sato, K., Kitajima, I., Nishioka, K., Yamamoto, K., Takeda, T., Hatanaka, M., Yamamoto, H. & Sekiguchi, T. (1991) Induction of inflammatory arthropathy resembling rheumatoid arthritis in mice transgenic for HTLV-I. *Science*, **253**, 1026–1028
- Iwakura, Y., Tosu, M., Yoshida, E., Saijo, S., Nakayama-Yamada, J., Itagaki, K., Asano, M., Siomi, H., Hatanaka, M., Takeda, T., Nunoya, T., Ueda, S. & Shibuta, H. (1994) Augmentation of *c-fos* and *c-jun* expression in transgenic mice carrying the human T-cell leukemia virus type I *tax* gene. *Virus Genes*, **9**, 161–170
- Iwakura, Y., Saijo, S., Kioka, Y., Nakayama-Yamada, J., Itagaki, K., Tosu, M., Asano, M., Kanai, Y. & Kakimoto, K. (1995) Autoimmunity induction by human T-cell leukemia virus type I in transgenic mice that develop chronic inflammatory arthropathy resembling rheumatoid arthritis in humans. *J. Immunol.*, **155**, 1588–1598
- Iwata, K., Ito, S.-I., Saito, H., Ito, M., Nagatomo, M., Yamasaki, T., Yoshida, S., Suto, H. & Tajima, K. (1994) Mortality among inhabitants of an HTLV-I endemic area in Japan. *Jpn. J. Cancer Res.*, **85**, 231–237
- Jacobson, S., Shida, H., McFarlin, D.E., Fauci, A.S. & Koenig, S. (1990) Circulating CD8⁺ cytotoxic T lymphocytes specific for HTLV-I pX in patients with HTLV-I associated neurological disease. *Nature*, **348**, 245–248
- Jang, D., Mahony, J.B., Sellors, J.W., Galli, R., Gregory, B. & Chernesky, M.A. (1995) Lack of specificity of HTLV antibody enzyme immunoassays. *J. acquir. Immune Defic. Syndr. hum. Retrovirol.*, **9**, 523–524

- Janssen, R.S., Kaplan, J.E., Khabbaz, R.F., Hammond, R., Lechtenberg, R., Lairmore, M., Chiasson, M.A., Punsalang, A., Roberts, B., McKendall, R.R., Rosenblum, M., Brew, B., Farraye, J., Howley, D.J., Feraru, E., Sparr, S., Vecchio, J., Silverman, M., McHarg, M., Gorin, B., Rugg, D.R., Grenell, S., Trimble, B., Bruining, K., Guha, S., Amaraneni, P. & Price, R.W. (1991) HTLV-I-associated myelopathy/tropical spastic paraparesis in the United States. *Neurology*, **41**, 1355–1357
- Jayo, M.J., Laber-Laird, K., Bullock, B.C., Tulli, H.M. & Reynolds, G.M. (1990) T-cell lymphosarcoma in a female African green monkey (*Cercopithecus aethiops*). *Lab. Anim. Sci.*, **40**, 37–41
- Jeang, K.-T., Boros, I., Brady, J., Radonovich, M. & Khoury, G. (1988a) Characterization of cellular factors that interact with the human T-cell leukemia virus type I p40^x- responsive 21-base-pair sequence. *J. Virol.*, **62**, 4499–4509
- Jeang, K.-T., Shank, P.R. & Kumar, A. (1988b) Transcriptional activation of homologous viral long terminal repeats by the human immunodeficiency virus type I or the human T-cell leukemia virus type I Tat proteins occurs in the absence of de novo protein synthesis. *Proc. natl Acad. Sci. USA*, **85**, 8291–8295
- Jeang, K.-T., Widen, S.G., Seemes, O.J., IV & Wilson, S.H. (1990) HTLV-I trans-activator protein, Tax, is a trans-repressor of the human β -polymerase gene. *Science*, **247**, 1082–1084
- Jeannel, D., Garin, B., Kazadi, K., Singa, L. & de Thé, G. (1993) The risk of tropical spastic paraparesis differs according to ethnic group among HTLV-I carriers in Inongo, Zaire. *J. acquir. immune Defic. Syndr.*, **6**, 840–844
- Jeannel, D., Kourouma, K., Fretz, C., Zheng, Y.M., Ureta, V.A., Dramé, L., Gessain, A., Fournel, J.J. & de Thé, G. (1995) Regional differences in human retroviral infections HIV-1, HIV-2, and HTLV-I/II in rural Guinea (West Africa) (Letter to the Editor). *J. acquir. Immune Defic. Syndr. hum. Retrovirol.*, **8**, 315–318
- Jensen, W.A., Rovnak, J. & Cockerell, G.L. (1991) In vivo transcription of the bovine leukemia virus *tax/rex* region in normal and neoplastic lymphocytes of cattle and sheep. *J. Virol.*, **65**, 2484–2490
- Joshi, J.B. & Dave, H.P.G. (1992) Transactivation of the proenkephalin gene promoter by the Tax₁ protein of human T-cell lymphotropic virus type I. *Proc. natl Acad. Sci. USA*, **89**, 1006–1010
- Kajiyama, W., Kashiwagi, S., Ikematsu, H., Hayashi, J., Nomura, H. & Okochi, K. (1986) Intra-familial transmission of adult T cell leukemia virus. *J. infect. Dis.*, **154**, 851–857
- Kalyanaraman, V.S., Sarngadharan, M.G., Robert-Guroff, M., Miyoshi, I., Blayney, D., Golde, D. & Gallo, R.C. (1982) A new subtype of human T-cell leukemia virus (HTLV-II) associated with a T-cell variant of hairy cell leukemia. *Science*, **218**, 571–573
- Kamada, N., Tanaka, K., Takechi, M. & Kikuchi, M. (1990) Chromosome aberrations in adult T cell leukemia. *Hematol. Rev.*, **3**, 257–270
- Kamihira, S., Yamada, Y., Sohda, H., Atogami, S., Tomonaga, M., Egawa, S., Fujii, M. & Chifu, K. (1994) Human T-lymphotropic virus type-I influence on hepatotropic virus infections and the subsequent development of hepatocellular carcinoma. *Cancer Detect. Prev.*, **18**, 329–334
- Kanamori, H., Suzuki, N., Siomi, H., Nosaka, T., Sato, A., Sabe, H., Hatanaka, M. & Honjo, T. (1990) HTLV-I p27^{ex} stabilizes human interleukin 2 receptor α chain mRNA. *EMBO J.*, **9**, 4161–4166

- Kannagi, M., Sugamura, K., Sato, H., Okochi, K., Uchino, H. & Hinuma, Y. (1983) Establishment of human cytotoxic T cell lines specific for human adult T cell leukemia virus-bearing cells. *J. Immunol.*, **130**, 2942–2946
- Kannagi, M., Sugamura, K., Kinoshita, K.-I., Uchino, H. & Hinuma, Y. (1984) Specific cytolysis of fresh tumor cells by an autologous killer T cell line derived from an adult T cell leukemia/lymphoma patient. *J. Immunol.*, **133**, 1037–1041
- Kano, T. (1984) Distribution of pygmy chimpanzees (*Pan paniscus*) in the central Zaire basin. *Folia primatol.*, **43**, 36–52
- Kaplan, J.E. & Khabbaz, R. (1993) The epidemiology of human T-lymphotropic virus types I and II. *Med. Virol.*, **3**, 137–148
- Kaplan, J.E., Osame, M., Kubota, H., Igata, A., Nishitani, H., Maeda, Y., Khabbaz, R.F. & Janssen, R.S. (1990) The risk of development of HTLV-I-associated myelopathy/tropical spastic paraparesis among persons infected with HTLV-I. *J. acquir. immune Defic. Syndr.*, **3**, 1096–1101
- Karopoulos, A., Silvester, C. & Dax, E.M. (1993) A comparison of the performance of nine commercially available anti-HTLV-I screening assays. *J. virol. Meth.*, **45**, 83–91
- Kashiwagi, S., Kajiyama, W., Hayashi, J., Noguchi, A., Nakashima, K., Nomura, H., Ikematsu, H., Sawada, T., Kida, S. & Koide, A. (1990) Antibody to p40^{int} protein of human T cell leukemia virus I and infectivity. *J. infect. Dis.*, **161**, 426–429
- Katamine, S., Moriuchi, R., Yamamoto, T., Terada, K., Eguchi, K., Tsuji, Y., Yamabe, T., Miyamoto, T. & Hino, S. (1994) HTLV-I proviral DNA in umbilical cord blood of babies born to carrier mothers. *Lancet*, **343**, 1326–1327
- Kataoka, R., Takehara, N., Iwahara, Y., Sawada, T., Ohtsuki, Y., Dawei, Y., Hoshino, H. & Miyoshi, I. (1990) Transmission of HTLV-I by blood transfusion and its prevention by passive immunization in rabbits. *Blood*, **76**, 1657–1661
- Katsuki, T., Katsuki, K., Imai, J. & Hinuma, Y. (1987) Immune suppression in healthy carriers of adult T-cell leukemia retrovirus (HTLV-I): impairment of T-cell control of Epstein-Barr virus infected B-cells. *Jpn. J. Cancer Res. (Gann)*, **78**, 639–642
- Kawai, H., Kashiwagi, S., Inui, T., Tamaki, Y., Sano, Y. & Saito, S. (1991) HTLV-I associated myelopathy (HAM/TSP) with Hashimoto's thyroiditis. *Tokushima J. exp. Med.*, **38**, 99–102
- Kawai, H., Inui, T., Kashiwagi, S., Tsuchihashi, T., Masuda, K., Kondo, A., Niki, S., Iwasa, M. & Saito, S. (1992) HTLV-I infection in patients with autoimmune thyroiditis (Hashimoto's thyroiditis). *J. med. Virol.*, **38**, 138–141
- Kawano, F., Tsuda, H., Yamaguchi, K., Nishimura, H., Sanada, I., Matsuzaki, H., Ishii, M. & Takatsuki, K. (1984) Unusual clinical courses of adult T-cell leukemia in siblings. *Cancer*, **54**, 131–134
- Kayembe, K., Goubau, P., Desmyter, J., Vlietinck, R. & Carton, H. (1990) A cluster of HTLV-I associated tropical spastic paraparesis in Equateur (Zaire): ethnic and familial distribution. *J. Neurol. Neurosurg. Psychiat.*, **53**, 4–10
- Kelly, K., Davis, P., Mitsuya, H., Irving, S., Wright, J., Grassmann, R., Fleckenstein, B., Wano, Y., Greene, W. & Siebenlist, U. (1992) A high proportion of early response genes are constitutively activated in T-cells by HTLV-I. *Oncogene*, **7**, 1463–1470
- Kenyon, S.J. & Piper, C.E. (1977) Cellular basis of persistent lymphocytosis in cattle infected with bovine leukemia virus. *Infect. Immunol.*, **16**, 891–897

- Kettmann, R., Cleuter, Y., Mammerickx, M., Meunier-Rotival, M., Bernardi, G., Burny, A. & Chantrenne, H. (1980a) Genomic integration of bovine leukemia provirus: comparison between persistent lymphocytosis with lymph node tumor form of enzootic bovine leukosis. *Proc. natl Acad. Sci. USA*, **77**, 2577–2581
- Kettmann, R., Marbaix, G., Cleuter, Y., Portetelle, D., Mammerickx, M. & Burny, A. (1980b) Genomic integration of bovine leukemia provirus and lack of viral RNA expression in the target cells of cattle with different response to BLV infection. *Leuk. Res.*, **4**, 509–519
- Kettmann, R., Deschamps, J., Couez, D., Claustriau, J.-J., Palm, R. & Burny, A. (1983) Chromosome integration domain for bovine leukemia provirus in tumors. *J. Virol.*, **47**, 146–150
- Kettmann, R., Mammerickx, M., Portetelle, D., Grégoire, D. & Burny, A. (1984) Experimental infection of sheep and goat with bovine leukemia virus: localization of proviral information in the target cells. *Leuk. Res.*, **8**, 937–944
- Kettmann, R., Burny, A., Callebaut, I., Droogmans, L., Mammerickx, M., Willems, L. & Portetelle, D. (1994) Bovine leukemia virus. In: Levy, J.A., ed., *The Retroviridae*, Vol. 3, New York, Plenum Press, pp. 39–81
- Khabbaz, R.F., Darrow, W.W., Hartley, T.M., Witte, J., Cohen, J.B., French, J., Gill, P.S., Potterat, J., Sikes, R.K., Reich, R., Kaplan, J.E. & Laimore, M.D. (1990) Seroprevalence and risk factors for HTLV-I/II infection among female prostitutes in the United States. *J. Am. med. Assoc.*, **263**, 60–64
- Khabbaz, R.F., Onorato, I.M., Cannon, R.O., Hartley, T.M., Roberts, B., Hosein, B. & Kaplan, J.E. (1992) Seroprevalence of HTLV-I and HTLV-II among intravenous drug users and persons in clinics for sexually transmitted diseases. *New Engl. J. Med.*, **326**, 375–380
- Khono, T., Uchida, H., Inomata, H., Fukushima, S., Takeshita, M. & Kikuchi, M. (1993) Ocular manifestations of adult-T-cell leukemia/lymphoma. A clinicopathologic study. *Ophthalmology*, **100**, 1794–1799
- Kim, S.-J., Kehrl, J.H., Burton, J., Tendler, C.L., Jeang, K.-T., Danielpour, D., Thevenin, C., Kim, K.Y., Sporn, M.B. & Roberts, A.B. (1990) Transactivation of the transforming growth factor $\beta 1$ (TGF- $\beta 1$) gene by human T-lymphotropic virus type I Tax: a potential mechanism for the increased production of TGF- $\beta 1$ in adult T-cell leukemia. *J. exp. Med.*, **172**, 121–129
- Kim, S.-J., Winokur, T.S., Lee, H.-D., Danielpour, D., Kim, K.Y., Geiser, A.G., Chen, L.-S., Sporn, M.B., Roberts, A.B. & Jay, G. (1991) Overexpression of transforming growth factor- β in transgenic mice carrying the human T-cell lymphotropic virus type I *tax* gene. *Mol. cell. Biol.*, **11**, 5222–5228
- Kimata, J.T., Palker, T.J. & Ratner, L. (1993) The mitogenic activity of Human T-cell leukemia virus type I is T-cell associated and requires the CD2/LFA-3 activation pathway. *J. Virol.*, **67**, 3134–3141
- Kimata, J.T., Wong, F.-H., Wang, J.J. & Ratner, L. (1994) Construction and characterization of infectious human T-cell leukemia virus type I molecular clones. *Virology*, **204**, 656–664
- Kinoshita, K., Hino, S., Amagasaki, T., Ikeda, S.-I., Yamada, Y., Suzuyama, J., Momita, S., Toriya, K., Kamihira, S. & Ichimaru, M. (1984) Demonstration of adult T-cell leukemia virus antigen in milk from three sero-positive mothers. *Gann*, **75**, 103–105
- Kinoshita, K., Yamanouchi, K., Ikeda, S.-I., Momita, S., Amagasaki, T., Soda, H., Ichimaru, M., Moriuchi, R., Katamine, S., Miyamoto, T. & Hino, S. (1985a) Oral infection of a common marmoset with human T-cell leukemia virus type-I (HTLV-I) by inoculating fresh human milk of HTLV-I carrier mothers. *Jpn. J. Cancer Res.*, **76**, 1147–1153

- Kinoshita, K., Amagasaki, T., Ikeda, S.-I., Suzuyama, J., Toriya, K., Nishino, K., Tagawa, M., Ichimaru, M., Kamihira, S., Yamada, Y., Momita, S., Kusano, M., Morikawa, T., Fujita, S., Umeda, Y., Ito, N. & Yoshida, M. (1985b) Preleukemic state of adult T cell leukemia: abnormal T lymphocytosis induced by human adult T cell leukemia-lymphoma virus. *Blood*, **66**, 120–127
- Kira, J.-I. (1994) The presence of HTLV-I proviral DNA in the central nervous system of patients with HTLV-I-associated myelopathy/tropical spastic paraparesis. *Mol. Neurobiol.*, **8**, 139–145
- Kira, J.-I., Koyanagi, Y., Yamada, T., Itoyama, Y., Goto, I., Yamamoto, N., Sasaki, H. & Sasaki, Y. (1991) Increased HTLV-I proviral DNA in HTLV-I-associated myelopathy: a quantitative polymerase chain reaction study. *Ann. Neurol.*, **29**, 194–201
- Kira, J.-I., Itoyama, Y., Koyanagi, Y., Tateishi, J., Kishikawa, M., Akizuki, S.-I., Kobayashi, I., Toki, N., Sueishi, K., Sato, H., Sakaki, Y., Yamamoto, N. & Goto, I. (1992a) Presence of HTLV-I proviral DNA in central nervous system of patients with HTLV-I-associated myelopathy. *Ann. Neurol.*, **31**, 39–45
- Kira, J.-I., Nakamura, M., Sawada, T., Koyanagi, Y., Ohori, N., Itoyama, Y., Yamamoto, N., Sakaki, Y. & Goto, I. (1992b) Antibody titers to HTLV-I-p40 Tax protein and gag-env hybrid protein in HTLV-I-associated myelopathy/tropical spastic paraparesis: correlation with increased HTLV-I proviral DNA load. *J. neurol. Sci.*, **107**, 98–104
- Kitajima, I., Maruyama, I., Maruyama, Y., Ijichi, S., Eiraku, N., Mimura, Y. & Osame, M. (1989) Polyarthrititis in human T lymphotropic virus type I-associated myelopathy (Letter to the Editor). *Arthrit. Rheum.*, **32**, 1342–1344
- Kitajima, I., Yamamoto, K., Sato, K., Nakajima, Y., Nakajima, Y., Maruyama, I., Osame, M. & Nishioka, K. (1991) Detection of human T cell lymphotropic virus type I proviral DNA and its gene expression in synovial cells in chronic inflammatory arthropathy. *J. clin. Invest.*, **88**, 1315–1322
- Kiyokawa, T., Seiki, M., Iwashita, S., Imagawa, K., Shimizu, F. & Yoshida, M. (1985) p27^{x-III} and p21^{x-III}, proteins encoded by the pX sequence of human T-cell leukemia virus type I. *Proc. natl Acad. Sci. USA*, **82**, 8359–8363
- Kleinman, S.H., Kaplan, J.E., Khabbaz, R.F., Calabro, M.A., Thomson, R., Busch, M. & the Retrovirus Epidemiology Donor Study Group (1994) Evaluation of a p21e-spiked western blot (immunoblot) in confirming human T-cell lymphotropic virus type I or II infection in volunteer blood donors. *J. clin. Microbiol.*, **32**, 603–607
- Kline, R.L., Brothers, T., Halsey, N., Boulos, R., Lairmore, M.D. & Quinn, T.C. (1991) Evaluation of enzyme immunoassays for antibody to human T-lymphotropic viruses type I/II. *Lancet*, **337**, 30–33
- Kohno, T., Uchida, H., Inomata, H., Fukushima, S., Takeshita, M. & Kikuchi, M. (1993) Ocular manifestations of adult T-cell leukemia/lymphoma. A clinopathological study. *Ophthalmology*, **100**, 1794–1799
- Komori, T., Kasajima, T., Yamamoto, T., Shibata, N. & Kobayashi, M. (1995) An unclassified cerebral small cell tumor in a patient with human T-cell lymphotropic virus type I-induced primary extranodal lymphoma. *Mod. Pathol.*, **8**, 811–816
- Komurian, F., Pelloquin, F. & de Thé, G. (1991) In vivo genomic variability of human T-cell leukemia virus type I depends more upon geography than upon pathologies. *J. Virol.*, **65**, 3770–3778

- Komuro, A., Watanabe, T., Miyoshi, I., Hayami, M., Tsujimoto, H., Seiki, M. & Yoshida, M. (1984) Detection and characterization of simian retroviruses homologous to human T-cell leukemia virus type I. *Virology*, **138**, 373–378
- Kondo, T., Kono, H., Nonaka, H., Miyamoto, N., Yoshida, R., Bando, F., Inoue, H., Miyoshi, I., Hinuma, Y. & Hanaoka, M. (1987) Risk of adult T-cell leukaemia/lymphoma in HTLV-I carriers (Letter to the Editor). *Lancet*, **ii**, 159
- Kondo, T., Kono, H., Miyamoto, N., Yoshida, R., Toki, H., Matsumoto, I., Hara, M., Inoue, H., Inatsuki, A., Funatsu, T., Yamano, N., Bando, F., Iwao, E., Miyoshi, I., Hinuma, Y. & Hanaoka, M. (1989) Age- and sex-specific cumulative rate and risk of ATLL for HTLV-I carriers. *Int. J. Cancer*, **43**, 1061–1064
- Kondo, A., Imada, K., Hattori, T., Yamabe, H., Tanaka, T., Miyasaka, M., Okuma, M. & Uchiyama, T. (1993) A model of in vivo cell proliferation of adult T-cell leukemia. *Blood*, **82**, 2501–2509
- Koralnik, I.J., Lemp, J.F., Jr, Gallo, R.C. & Franchini, G. (1992a) In vitro infection of human macrophages by human T-cell leukemia/lymphotropic virus type I (HTLV-I). *AIDS Res. hum. Retroviruses*, **8**, 1845–1849
- Koralnik, I.J., Gessain, A., Klotman, M.E., Lo Monico, A., Berneman, Z.N. & Franchini, G. (1992b) Protein isoforms encoded by the *pX* region of human T-cell leukemia/lymphotropic virus type I. *Proc. natl Acad. Sci. USA*, **89**, 8813–8817
- Koralnik, I.J., Fullen, J. & Franchini, G. (1993) The p12ⁱ, p13ⁱⁱ, and p30ⁱⁱⁱ proteins encoded by human T-cell leukemia/lymphotropic virus type I open reading frames I and II are localized in three different cellular compartments. *J. Virol.*, **67**, 2360–2366
- Koralnik, I.J., Boeri, E., Saxinger, W.C., Lo Monico, A., Fullen, J., Gessain, A., Guo, H.-G., Gallo, R.C., Markham, P., Kalyanaraman, V., Hirsch, V., Allan, J., Murthy, K., Alford, P., Slatery, J.P., O'Brien, S.J. & Franchini, G. (1994) Phylogenetic associations of human and simian T-cell leukemia/lymphotropic virus type I strains: evidence for interspecies transmission. *J. Virol.*, **68**, 2693–2707
- Kosaka, M., Iishi, Y., Horiuchi, N., Nakao, K., Okagawa, K., Saito, S., Minami, Y. & Katoh, K. (1989) A cluster of human T-lymphotropic virus type-I carriers found in the southern district of Tokushima Prefecture. *Jpn. J. clin. Oncol.*, **19**, 30–35
- Kubota, R., Fujiyoshi, T., Izumo, S., Yashiki, S., Maruyama, I., Osame, M. & Sonoda, S. (1993) Fluctuation of HTLV-I proviral DNA in peripheral blood mononuclear cells of HTLV-I associated myelopathy. *J. Neuroimmunol.*, **42**, 147–154
- Kumar, S.R., Gill, P.S., Wagner, D.G., Dugel, P.U., Moudgil, T. & Rao, N.A. (1994) Human T-cell lymphotropic virus type-I associated retinal lymphoma. *Arch. Ophthalmol.*, **112**, 954–959
- Kuroda, Y., Matsui, M., Kikuchi, M., Kurohara, K., Endo, C., Yukitake, M., Matsuda, Y., Tokunaga, O., Komine-Sakaki, A. & Kawaguchi, R. (1994) In situ demonstration of the HTLV-I genome in the spinal cord of a patient with HTLV-I-associated myelopathy. *Neurology*, **44**, 2295–2299
- Kwok, S., Lipka, J.J., McKinney, N., Kellogg, D.E., Poiesz, B., Fong, S.K. & Sninsky, J.J. (1990) Low incidence of HTLV infections in random blood donors with indeterminate western blot patterns. *Transfusion*, **30**, 491–494

- Kwok, R.P.S., Lurance, M.E., Lundblad, J.R., Goldman, P.S., Shih, H.-M., Connor, L.M., Marriott, S.J. & Goodman, R.H. (1996) Control of cAMP-regulated enhancers by the viral transactivator Tax through CREB and the co-activator CBP. *Nature*, **380**, 642–646
- LaGrenade, L. (1994) HTLV-I, infective dermatitis and tropical spastic paraparesis. *Mol. Neurobiol.*, **8**, 147–148
- LaGrenade, L., Hanchard, B., Fletcher, V., Cranston, B. & Blattner, W. (1990) Infective dermatitis of Jamaican children: a marker for HTLV-I infection. *Lancet*, **336**, 1345–1347
- Lairmore, M.D., Jason, J.M., Hartley, T.M., Khabbaz, R.F., De, B. & Evatt, B.L. (1989) Absence of human T-cell lymphotropic virus type I coinfection in human immunodeficiency virus-infected hemophilic men. *Blood*, **74**, 2596–2599
- Lal, R.B. (1996) Delineation of immunodominant epitopes of human T-lymphotropic virus types-I and -II and their usefulness in developing serologic assays for detection of antibodies to HTLV-I and HTLV-II. *J. acquir. Immune Defic. Syndr. hum. Retrovirol.* (in press)
- Lal, R.B. & Heinene, W. (1996) Testing for human T-lymphotropic virus type-I and -II: serological, virological and molecular detection. In: Hölsberg, P. & Hafler, D., eds, *Human T-Lymphotropic Virus Type I*, New York, John Wiley (in press)
- Lal, R.B., Rudolph, D.L., Lairmore, M.D., Khabbaz, R.F., Garfield, M., Coligan, J.E. & Folks, T.M. (1991) Serologic discrimination of human T cell lymphotropic virus infection by using a synthetic peptide-based enzyme immunoassay. *J. infect. Dis.*, **163**, 41–46
- Lal, R.B., Brodine, S., Kazura, J., Mbidde-Katonga, E., Yanagihara, R. & Roberts, C. (1992a) Sensitivity and specificity of a recombinant transmembrane glycoprotein (rgp21)-spiked western immunoblot for serological confirmation of human T-cell lymphotropic virus type-I and type-II infections. *J. clin. Microbiol.*, **30**, 296–299
- Lal, R.B., Rudolph, D.L., Coligan, J.E., Brodine, S.K. & Roberts, C.R. (1992b) Failure to detect evidence of human T-lymphotropic virus (HTLV) type I and type II in blood donors with isolated *gag* antibodies to HTLV-I/II. *Blood*, **80**, 544–550
- Lal, R.B., Rudolph, D.L., Nerurkar, V.R. & Yanagihara, R. (1992c) Humoral responses to the immunodominant *gag* and *env* epitopes of human T-lymphotropic virus type I among Melanesians. *Viral Immunol.*, **5**, 265–272
- Lal, R.B., Buckner, C., Khabbaz, R.F., Kaplan, J.E., Reyes, G., Hadlock, K., Lipka, J., Fong, S.K., Chan, L. & Coligan, J.E. (1993) Isotypic and IgG subclass restriction of the humoral immune responses to human T-lymphotropic virus type-I. *Clin. Immunol. Immunopathol.*, **67**, 40–49
- Lapin, B.A. (1969) Experiments in monkeys with human leukaemia. *Primates Med.*, **3**, 23–27
- Lee, S.Y., Yamaguchi, K., Takatsuki, K., Kim, B.K., Park, S. & Lee, M. (1986) Seroepidemiology of human T-cell leukemia virus type-I in the Republic of Korea. *Jpn. J. Cancer Res. (Gann)*, **77**, 250–254
- Lee, H., Swanson, P., Shorty, V.S., Zack, J.A., Rosenblatt, J.D. & Chen, I.S.Y. (1989) High rate of HTLV-II infection in seropositive IV drug abusers in New Orleans. *Science*, **244**, 471–475
- Lee, H.H., Swanson, P., Rosenblatt, J.D., Chen, I.S.Y., Sherwood, W.C., Smith, D.E., Tegtmeier, G.E., Fernando, L.P., Fang, C.T., Osame, M. & Kleinman, S.H. (1991) Relative prevalence and risk factors of HTLV-I and HTLV-II infection in US blood donors. *Lancet*, **337**, 1435–1439

- Lennert, K., Kikuchi, M., Sato, E., Suchi, T., Stansfeld, A.G., Feller, A.C., Hansmann, M.-L., Müller-Hermelink, H.K. & Götting-Salz, E. (1985) HTLV-positive and -negative T-cell lymphomas. Morphological and immunohistochemical differences between European and HTLV-positive Japanese T-cell lymphomas. *Int. J. Cancer*, **35**, 65–72
- Leno, M., Simpson, R.M., Bowers, F.S. & Kindt, T.J. (1995) Human T lymphocyte virus I from a leukemogenic cell line mediates *in vivo* and *in vitro* lymphocyte apoptosis. *J. exp. Med.*, **181**, 1575–1580
- Lerche, N.W., Marx, P.A., Osborn, K.G., Maul, D.H., Lowenstine, L.J., Bleviss, M.L., Moody, P., Henrickson, R.V. & Gardner, M.B. (1987) Natural history of endemic type D retrovirus infection and acquired immune deficiency syndrome in group-housed *rhesus* monkeys. *J. natl Cancer Inst.*, **79**, 847–854
- Levin, M.C., Fox, R.J., Lehky, T., Walter, M., Fox, C.H., Flerlage, N., Bamford, R. & Jacobson, S. (1996) PCR-in situ hybridization detection of human T-cell lymphotropic virus type I (HTLV-I) *tax* proviral DNA in peripheral blood lymphocytes of patients with HTLV-I-associated neurologic disease. *J. Virol.*, **70**, 924–933
- Levine, P.H., Blattner, W.A., Clark, J., Tarone, R., Maloney, E.M., Murphy, E.M., Gallo, R.C., Robert-Guroff, M. & Saxinger, W.C. (1988) Geographic distribution of HTLV-I and identification of a new high-risk population. *Int. J. Cancer*, **42**, 7–12
- Levine, P.H., Manns, A., Jaffe, E.S., Colclough, G., Cavallaro, A., Reddy, G. & Blattner, W.A. (1994) The effect of ethnic differences on the pattern of HTLV-I-associated T-cell leukemia/lymphoma (HATL) in the United States. *Int. J. Cancer*, **56**, 177–181
- Levy, J.A., ed. (1992–95) *The Retroviridae*, Vols 1–4, New York, Plenum Press
- Lewin, H.A. & Bernoco, D. (1986) Evidence for BoLA-linked resistance and susceptibility to subclinical progression of bovine leukemia virus infection. *Anim. Genet.*, **17**, 197–207
- Lewin, H.A., Wu, M.-C., Stewart, J.A. & Nolan, T.J. (1988) Association between BoLA and subclinical bovine leukemia virus infection in a herd of Holstein-Friesian cows. *Immunogenetics*, **27**, 338–344
- Li, C.-C.H., Ruscetti, F.W., Rice, N.R., Chen, E., Yang, N.-S., Mikovits, J. & Longo, D.L. (1993) Differential expression of Rel family members in human T-cell leukemia virus type I-infected cells: transcriptional activation of *c-rel* by Tax protein. *J. Virol.*, **67**, 4205–4213
- Lilienbaum, A., Duc Dodon, M., Alexandre, C., Gazzolo, L. & Paulin, D. (1990) Effect of human T-cell leukemia virus type I Tax protein on activation of the human vimentin gene. *J. Virol.*, **64**, 256–263
- Lillehoj, EP., Alexander, S.S., Dubrule, C.J., Wiktor, S., Adams, R., Tai, C.-C., Manns, A. & Blattner, W.A. (1990) Development and evaluation of a human T-cell leukemia virus type I serological confirmatory assay incorporating a recombinant envelope polypeptide. *J. clin. Microbiol.*, **28**, 2653–2658
- Lindholm, P.F., Reid, R.L. & Brady, J.N. (1992) Extracellular Tax1 protein stimulates tumor necrosis factor- β and immunoglobulin kappa light chain expression in lymphoid cells. *J. Virol.*, **66**, 1294–1302
- Linhares, M.I.S., Eizuru, Y., de Andrade, G.P., Fonseca, I.B., Carvalho, L.B., Jr, Moreira, I.T. & Minamishima, Y. (1994) Human T cell leukemia virus type I (HTLV-I) antibodies in healthy populations and renal transplanted patients in the north-east of Brazil. *Microbiol. Immunol.*, **38**, 475–478

- Lipka, J.J., Bui, K., Reyes, G.R., Moeckli, R., Wiktor, S.Z., Blattner, W.A., Murphy, E.L., Shaw, G.M., Hanson, C.V., Sninsky, J.J. & Fount, S.K.H. (1990) Determination of a unique and immunodominant epitope of human T cell lymphotropic virus type I. *J. infect. Dis.*, **162**, 353–357
- Lipka, J.J., Miyoshi, I., Hadlock, K.G., Reyes, G.R., Chow, T.P., Blattner, W.A., Shaw, G.M., Hanson, C.V., Gallo, D., Chan, L. & Fount, S.K.H. (1992) Segregation of human T-cell lymphotropic virus type-I and type-II infections by antibody reactivity to unique viral epitopes. *J. infect. Dis.*, **165**, 268–272
- Liu, H.-F., Vandamme, A.-M., Van Brussel, M., Desmyter, J. & Goubau, P. (1994) New retroviruses in human and simian T-lymphotropic viruses (Letter to the Editor). *Lancet*, **344**, 265–266
- Longo, D.L., Gelmann, E.P., Cossman, J., Young, R.A., Gallo, R.C., O'Brien, S.J. & Matis, L.A. (1984) Isolation of HTLV-I transformed B-lymphocytes clone from a patient with HTLV-associated adult T-cell leukemia. *Nature*, **310**, 505–506
- Loughran, T.P., Jr, Coyle, T., Sherman, M.P., Starkebaum, G., Ehrlich, G.D., Ruscetti, F.W. & Poiesz, B.J. (1992) Detection of human T-cell leukemia/lymphoma virus, type II, in a patient with large granular lymphocyte leukemia. *Blood*, **80**, 1116–1119
- Loughran, T.P., Jr, Sherman, M.P., Ruscetti, F.W., Frey, S., Coyle, T., Montagna, R.A., Jones, B., Starkebaum, G. & Poiesz, B.J. (1994) Prototypical HTLV-I/II infection is rare in LGL leukemia. *Leuk. Res.*, **18**, 423–429
- Lübbert, M., Miller, C.W., Kahan, J. & Koeffler, H.P. (1989) Expression, methylation and chromatin structure of the p53 gene in untransformed and human T-cell leukemia virus type I-transformed human T-lymphocytes. *Oncogene*, **4**, 643–651
- Lymphoma Study Group (1984–1987) (1991) Major prognostic factors of patients with adult T-cell leukemia-lymphoma: a cooperative study. *Leuk. Res.*, **15**, 81–90
- Maeda, Y., Furukawa, M., Takehara, Y., Yoshimura, K., Miyamoto, K., Matsuura, T., Morishima, Y., Tajima, K., Okochi, K. & Hinuma, Y. (1984) Prevalence of possible adult T-cell leukemia virus-carriers among volunteer blood donors in Japan: a nation-wide study. *Int. J. Cancer*, **33**, 717–720
- Maeda, M., Shimizu, A., Ikuta, K., Okamoto, H., Kashihara, M., Uchiyama, T., Honjo, T. & Yodoi, J. (1985) Origin of human T-lymphotropic virus I-positive T cell lines in adult T cell leukemia. *J. exp. Med.*, **162**, 2169–2174
- Maeda, M., Arima, N., Daitoku, Y., Kashihara, M., Okamoto, H., Uchiyama, T., Shirono, K., Matsuoka, M., Hattori, T., Takatsuki, K., Ikuta, K., Shimizu, A., Honjo, T. & Yodoi, J. (1987) Evidence for the interleukin-2 dependent expansion of leukemic cells in adult T-cell leukemia. *Blood*, **70**, 1407–1411
- Mahieux, R., Gessain, A., Truffert, A., Vitrac, D., Hubert, A., Dandelot, J., Montchamp-Moreau, C., Cnudde, F., Tekai, F. & de Thé, G. (1994) Seroepidemiology, viral isolation, and molecular characterization of human T cell leukemia/lymphoma virus type I from La Réunion Island, Indian Ocean. *AIDS Res. hum. Retroviruses*, **10**, 745–752
- Mahieux, R., de Thé, G. & Gessain, A. (1995) The tax mutation at nucleotide 7959 of human T-cell leukemia virus type I (HTLV-I) is not associated with tropical spastic paraparesis/HTLV-I-associated myelopathy but is linked to the cosmopolitan molecular genotype (Letter to the Editor). *J. Virol.*, **69**, 5925–5927

- Maloney, E.M., Ramirez, H., Levin, A. & Blattner, W.A. (1989) A survey of the human T-cell lymphotropic virus type I (HTLV-I) in south-western Colombia. *Int. J. Cancer*, **44**, 419–423
- Maloney, E.M., Murphy, E.L., Figueroa, J.P., Gibbs, W.N., Cranston, B., Hanchard, B., Holding-Cobham, M., Malley, K. & Blattner, W.A. (1991) Human T-lymphotropic virus type I (HTLV-I) seroprevalence in Jamaica. II. Geographic and ecologic determinants. *Am. J. Epidemiol.*, **133**, 1125–1134
- Manca, N., Piacentini, E., Gelmi, M., Calzavara, P., Manganoni, M.A., Glukhov, A., Gargiulo, F., De Francesco, M., Pirali, F., De Panfilis, G. & Turano, A. (1994) Persistence of human T cell lymphotropic virus type I (HTLV-I) sequences in peripheral blood mononuclear cells from patients with mycosis fungoides. *J. exp. Med.*, **180**, 1973–1978
- Mann, D.L., DeSantis, P., Mark, G., Pfeifer, A., Newman, M., Gibbs, N., Popovic, M., Sarngadharan, M.G., Gallo, R.C., Clark, J. & Blattner, W. (1987) HTLV-I-associated B-cell CLL: indirect role for retrovirus in leukemogenesis. *Science*, **236**, 1103–1106
- Manns, A. (1993) Natural history of HTLV-I infection: relationship to leukemogenesis. *Leukemia*, **7** (Suppl. 2), pp. S75–S77
- Manns, A., Murphy, E.L., Wilks, R., Haynes, G., Figueroa, J.P., Hanchard, B., Barnett, M., Drummond, J., Waters, D., Cerney, M., Seals, J.R., Alexander, S.S., Lee, H. & Blattner, W.A. (1991) Detection of early human T-cell lymphotropic virus type I antibody patterns during seroconversion among transfusion recipients. *Blood*, **77**, 896–905
- Manns, A., Wilks, R.J., Murphy, E.L., Haynes, G., Figueroa, J.P., Barnett, M., Hanchard, B. & Blattner, W.A. (1992) A prospective study of transmission by transfusion of HTLV-I and risk factors associated with seroconversion. *Int. J. Cancer*, **51**, 886–891
- Manns, A., Cleghorn, F.R., Falk, R.T., Hanchard, B., Jaffe, E.S., Bartholomew, C., Hartge, P., Benichou, J., Blattner, W.A. & the HTLV Lymphoma Study Group (1993) Role of HTLV-I in development of non-Hodgkin lymphoma in Jamaica and Trinidad and Tobago. *Lancet*, **342**, 1447–1450
- Manns, A., Wilks, R.J., Hanchard, B., St Clair Morgan, O., Rudolph, D.L. & Lal, R.B. (1994) Viral-specific humoral immune responses following transfusion-related transmission of human T cell lymphotropic virus type-I infection. *Viral Immunol.*, **7**, 113–120
- Mansueto, S., Miceli, M.D., Di Blasi, P., Alleto, G., Amico, A., Mancuso, S. & Gentile, G. (1995) Antibodies anti HTLV-I/II in Sicilian residents, in drug addicts, and in African immigrants. *Eur. J. Epidemiol.*, **11**, 359–360
- Manzari, V., Gradilone, A., Barillari, G., Zani, M., Collalti, E., Pandolfi, F., De Rossi, G., Liso, V., Babbo, P., Robert-Guroff, M. & Frati, L. (1985) HTLV-I is endemic in southern Italy: detection of the first infectious cluster in a white population. *Int. J. Cancer*, **36**, 557–559
- Manzari, V., Modesti, M., De Marchis, L., Gradilone, A., Cifaldi, L. & Marchei, P. (1990) HTLV-I and HIV-1 infection in patients with lymphadenopathy syndrome detected during routine breast screening at a tumor prevention center. *AIDS Res. hum. Retroviruses*, **6**, 417–421
- Mariette, X., Agbalika, F., Daniel, M.-T., Bisson, M., Lagrange, P., Brouet, J.-C. & Morinet, F. (1993) Detection of human T lymphotropic virus type I *tax* gene in salivary gland epithelium from two patients with Sjögren's syndrome. *Arthrit. Rheum.*, **36**, 1423–1428
- Mariette, X., Cherot, P., Cazals, D., Brocheriou, C., Brouet, J.-C. & Agbalika, F. (1994) Antibodies to HTLV-I in Sjögren's syndrome (Letter to the Editor). *Lancet*, **345**, 71

- Markham, P.D., Salahuddin, S.Z., Kalyanaraman, V.S., Popovic, M., Sarin, P. & Gallo, R.C. (1983) Infection and transformation of fresh human umbilical cord blood cells by multiple sources of human T-cell leukemia-lymphoma virus (HTLV). *Int. J. Cancer*, **31**, 413–420
- Marriott, S.J., Boros, I., Duvall, J.F. & Brady, J.N. (1989) Indirect binding of human T-cell leukemia virus type I tax₁ to a responsive element in the viral long terminal repeat. *Mol. cell. Biol.*, **9**, 4152–4160
- Marriott, S.J., Lindholm, P.F., Brown, K.M., Gitlin, S.D., Duvall, J.F., Radonovich, M.F. & Brady, J.N. (1990) A 36-kilodalton cellular transcription factor mediates an indirect interaction of human T-cell leukemia/lymphoma virus type I Tax₁ with a responsive element in the viral long terminal repeat. *Mol. cell. Biol.*, **10**, 4192–4201
- Marriott, S.J., Trinh, D. & Brady, J.N. (1992) Activation of interleukin-2 receptor alpha expression by extracellular HTLV-I Tax₁ protein: a potential role in HTLV-I pathogenesis. *Oncogene*, **7**, 1749–1755
- Martin, R.D. (1990) *Primate Origins and Evolution: A Phylogenetic Reconstruction*, Princeton, NJ, Princeton University Press
- Martin, M.P., Biggar, R.J., Hamlin-Green, G., Staal, S. & Mann, D. (1993) Large granular lymphocytosis in a patient infected with HTLV-II. *AIDS Res. hum. Retroviruses*, **9**, 715–719
- Maruyama, I., Tihara, J., Sakashita, I., Mizoguti, R., Mori, S., Usuku, K., Jonosono, M., Tara, M., Niina, S., Sonoda, S., Yasaki, S. & Osame, M. (1988) HTLV-I associated broncho-pneumonopathy — a new clinical entity (Abstract). *Am. Rev. respir. Dis.*, **137**, 46
- Massari, V., Elghouzzi, M.H., Agis, F., Rannou, C., Gordien, E., Costagliola, D. & Lefrère, J.J. (1994) Epidemiologic comparison of human T-lymphotropic virus type I-infected blood donors from endemic and nonendemic regions over a 3-year period. *Transfusion*, **34**, 198–201
- Matheise, J.P., Delcommenne, M., Mager, A., Didembourg, C.H. & Letesson, J.J. (1992) CD5⁺ B cells from bovine leukemia virus-infected cows are activated cycling cells responsive to interleukin 2. *Leukemia*, **6**, 304–309
- Matsumoto, K., Akashi, K., Shibata, H., Yutsudo, M. & Kakura, A. (1994) Single amino acid substitution (⁵⁸Pro→Ser) in HTLV-I Tax results in loss of *ras* cooperative focus formation in rat embryo fibroblasts. *Virology*, **200**, 813–815
- Matsumura, M., Kushida, S., Ami, Y., Suga, T., Uchida, K., Kameyama, T., Terano, A., Inoue, Y., Shiraki, H., Okochi, K., Sato, H. & Miwa, M. (1993) Quantitation of HTLV-I provirus among seropositive blood donors: relation with antibody profile using synthetic peptides. *Int. J. Cancer*, **55**, 220–222
- Matsuzaki, H., Asou, N., Kawaguchi, Y., Hata, H., Yoshinaga, T., Kinuwaki, E., Ishii, T., Yamaguchi, K. & Takatsuki, K. (1990) Human T-cell leukemia virus type I associated with small cell lung cancer. *Cancer*, **66**, 1763–1768
- Matutes, E. & Catovsky, D. (1992) Adult T cell leukaemia lymphoma. In: Whittaker, J.A., ed., *Leukaemia*, 2nd Ed., London, Blackwell Scientific Publications, pp. 416–433
- Matutes, E. & Catovsky, D. (1994) ATL of Caribbean origin. In: Takatsuki, K., ed., *Adult T-cell Leukaemia*, Oxford, Oxford University Press, pp. 113–138
- Matutes, E., Dalgleish, A.G., Weiss, R.A., Joseph, A.P. & Catovsky, D. (1986) Studies in healthy human T-cell leukemia lymphoma virus (HTLV-I) carriers from the Caribbean. *Int. J. Cancer*, **38**, 41–45

- Matutes, E., Schulz, T., Serpa, M.J., de Queiroz-Campos-Araujo, A. & Pombo de Oliveira, M.S. (1994) Report of the Second International Symposium on HTLV in Brazil. *Leukemia*, **8**, 1092–1094
- Matutes, E., Spittle, M.F., Smith, N.P., Eady, R.A.J. & Catovsky, D. (1995a) The first report of familial adult T-cell leukaemia lymphoma in the United Kingdom. *Br. J. Haematol.*, **89**, 615–619
- Matutes, E., Schulz, T., Dyer, M., Ellis, J., Hedges, M. & Catovsky, D. (1995b) Immunoblastic transformation of a Sézary syndrome in a black Caribbean patient without evidence of HTLV-I. *Leuk. Lymph.*, **18**, 521–527
- Mauclere, P., Le Hesran, J.Y., Gessain, A., Mahieux, R., Salla, R., de Thé, G. & Millan, J. (1994) Epidemiology of HTLV-I and HTLV-II in Cameroon, the situation revisited with stringent western-blot criterias (Abstract no. E-8). *AIDS Res. hum. Retroviruses*, **10**, 482
- May, J.T., Stent, G. & Schnagl, R.D. (1988) Antibody to human T-cell lymphotropic virus type I in Australian aborigines (Letter to the Editor). *Med. J. Aust.*, **149**, 104
- McCarthy, T.J., Kennedy, J.L., Blakeslee, J.R. & Bennett, B.T. (1990) Spontaneous malignant lymphoma and leukemia in a simian T-lymphotropic virus type I (STLV-I) antibody positive olive baboon. *Lab. Anim. Sci.*, **40**, 79–81
- McClure, H.M., Anderson, D.C., Gordon, T.P., Ansari, A.A., Fultz, P.N., Klumpp, S.A., Emau, P. & Isahakia, M. (1992) Natural simian immunodeficiency virus infections in nonhuman primates. In: Matano, S., Tuttle, R.H., Ishida, H. & Goodman, M., eds, *Topics in Primatology*, Vol. 3, Tokyo, University of Tokyo Press, pp. 425–438
- McGuire, K.L., Curtiss, V.E., Larson, E.L. & Haseltine, W.A. (1993) Influence of human T-cell leukemia virus type I *tax* and *rex* on interleukin-2 gene expression. *J. Virol.*, **67**, 1590–1599
- Mercieca, J., Matutes, E., Dearden, C., MacLennan, K. & Catovsky, D. (1994) The role of pentostatin in the treatment of T-cell malignancies: analysis of response rate in 145 patients according to disease subtype. *J. clin. Oncol.*, **12**, 2588–2593
- Merle, H., Smajda, D., Bera, O., Cabre, P. & Vernant, J.C. (1994) Ophthalmic manifestations in patients with HTLV-I associated myelopathy. A clinical study of 30 cases. *J. fr. Ophtalmol.*, **17**, 403–413 (in French)
- Meytes, D., Schochat, B., Lee, H., Nadel, G., Sidi, Y., Cerney, M., Swanson, P., Shaklai, M., Kilim, Y., Elgat, M., Chin, E., Danon, Y. & Rosenblatt, J.D. (1990) Serological and molecular survey for HTLV-I infection in a high-risk Middle Eastern group. *Lancet*, **336**, 1533–1535
- Miedema, F., Terpstra, F.G., Smit, J.W., Daenen, S., Gerrits, W., Hegde, U., Matutes, E., Catovsky, D., Greaves, M.F. & Melief, C.J.M. (1984) Functional properties of neoplastic T cells in adult T cell lymphoma/leukemia patients from the Caribbean. *Blood*, **63**, 477–481
- Migone, T.-S., Lin, J.-X., Ceresoto, A., Mulloy, J.C., O'Shea, J.J., Franchini, G. & Leonard, W.J. (1995) Constitutively activated Jak-STAT pathway in T-cells transformed with HTLV-I. *Science*, **269**, 79–81
- Miller, G.J., Pegram, S.M., Kirkwood, B.R., Beckles, G.L.A., Byam, N.T.A., Clayden, S.A., Kinlen, L.J., Chan, L.C., Carson, D.C. & Greaves, M.F. (1986) Ethnic composition, age and sex, together with location and standard of housing as determinants of HTLV-I infection in an urban Trinidadian community. *Int. J. Cancer*, **38**, 801–808

- Miller, G.J., Lewis, L.L., Colman, S.M., Cooper, J.A., Lloyd, G., Scollen, N., Jones, N., Tedder, R.S. & Greaves, M.F. (1994) Clustering of human T lymphotropic virus type I seropositive in Montserrat, West Indies: evidence for an environmental factor in transmission of the virus. *J. infect. Dis.*, **170**, 44–50
- Minamoto, G.Y., Gold, J.W.M., Scheinberg, D.A., Hardy, W.D., Chein, N., Zuckerman, E., Reich, L., Dietz, K., Gee, T., Hoffer, J., Mayer, K., Gabrilove, J., Clarkson, B. & Armstrong, D. (1988) Infection with human T-cell leukemia virus type I in patients with leukemia. *New Engl. J. Med.*, **318**, 219–222
- Minato, S.-I., Itoyama, Y., Fujii, N., Kira, J.-I., Guo, I. & Yamamoto, N. (1989) Activated T cells in HTLV-I-associated myelopathy: autologous mixed lymphocyte reaction. *Ann. Neurol.*, **26**, 398–401
- Mita, S., Sugimoto, M., Nakamura, M., Murakami, T., Tokunaga, M., Uyama, E. & Araki, S. (1993) Increased human T-lymphotropic virus type-I (HTLV-I) proviral DNA in peripheral blood mononuclear cells and bronchoalveolar lavage cells from Japanese patients with HTLV-I-associated myelopathy. *Am. J. trop. Med. Hyg.*, **48**, 170–177
- Miyamoto, Y., Yamaguchi, K., Nishimura, H., Takatsuki, K., Motoori, T., Morimatsu, M., Yasaka, T., Ohya, I. & Koga, T. (1985) Familial adult T-cell leukemia. *Cancer*, **55**, 181–185
- Miyata, H., Kamahara, T., Iha, S., Katamine, S., Miyamoto, T. & Hino, S. (1995) Dependency of antibody titer on provirus load in human T lymphotropic virus type I carriers: an interpretation for the minor population of seronegative carriers. *J. infec. Dis.*, **171**, 1455–1460
- Miyatake, S., Seiki, M., DeWaal Malefijt, R., Heike, T., Fujisawa, J.-I., Takebe, Y., Nishida, J., Shlomai, J., Yokota, T., Yoshida, M., Arai, K.-I. & Arai, N. (1988) Activation of T cell-derived lymphokine genes in T cells and fibroblasts; effects of human T cell leukemia virus type I p40^h protein and bovine papilloma virus encoded E2 protein. *Nucleic Acids Res.*, **16**, 6547–6566
- Miyazaki, K., Yamaguchi, K., Tohya, T., Ohba, T., Takatsuki, K. & Okamura, H. (1991) Human T-cell leukemia virus type I infection as an oncogenic and prognostic risk factor in cervical and vaginal carcinoma. *Obstet. Gynecol.*, **77**, 107–110
- Miyoshi, I. (1994) Animals models of HTLV-I infection. In: Takatsuki, K., ed., *Adult T-cell Leukaemia*, Oxford, Oxford Medical Publications, pp. 204–220
- Miyoshi, I., Kubonishi, I., Yoshimoto, S., Akagi, T., Ohtsuki, Y., Shiraishi, Y., Nagata, K. & Hinuma, Y. (1981) Type C virus particles in a cord [blood] T-cell line derived by co-cultivating normal human cord leukocytes and human leukaemic T-cells. *Nature*, **294**, 770–771
- Miyoshi, I., Fujishita, M., Taguchi, H., Matsubayashi, K., Miwa, N. & Tanioka, Y. (1983) Natural infection in non-human primates with adult T-cell leukemia virus or a closely related agent. *Int. J. Cancer*, **32**, 333–336
- Miyoshi, I., Yoshimoto, S., Kubonishi, I., Fujishita, M., Ohtsuku, Y., Yamashita, M., Yamato, K., Hirose, S., Taguchi, H., Niiya, K. & Kobayashi, M. (1985) Infectious transmission of human T-cell leukemia virus to rabbits. *Int. J. Cancer*, **35**, 81–85
- Mizokami, T., Okamura, K., Kohno, T., Sato, K., Ikenoue, H., Kuroda, T., Inokuchi, K. & Fujishima, M. (1995) Human T-lymphotropic virus type I-associated uveitis in patients with Graves' disease treated with methylmercaptoimidazole. *J. clin. Endocrinol. Metab.*, **80**, 1904–1907

- Moch, H., Lang, D. & Stamminger, T. (1992) Strong *trans* activation of the human cytomegalovirus major immediate-early enhancer by p40^{tax} of human T-cell Leukemia virus type I via two repetitive Tax-responsive sequence elements. *J. Virol.*, **66**, 7346–7354
- Mochizuki, M., Watanabe, T., Yamaguchi, K., Takatsuki, K., Yoshimura, K., Shirao, M., Nakashima, S., Mori, S., Araki, S. & Miyata, N. (1992) HTLV-I uveitis: a distinct clinical entity caused by HTLV-I. *Jpn. J. Cancer Res.*, **83**, 236–239
- Mochizuki, M., Tajima, K., Watanabe, T. & Yamaguchi, K. (1994) Human T lymphotropic virus type I uveitis. *Br. J. Ophthalmol.*, **78**, 149–154
- Moné, J., Whitehead, E., Leland, M., Hubbard, G. & Allan, J.S. (1992) Simian T-cell leukemia virus type I infection in captive baboons. *AIDS Res. hum. Retroviruses*, **8**, 1653–1661
- Monplaisir, N., Neisson-Vernant, C., Bouillot, M., Duc-Dodon, M., Ugarte, E., Valette, I., Dezaphy, Y., Ouka, M., Eudarc, M.G., Gazzolo, L., Larouze, B. & D'Auriol, L. (1993) HTLV-I maternal transmission in Martinique, using serology and polymerase chain reaction. *AIDS Res. hum. Retroviruses*, **9**, 869–874
- Morand-Joubert, L., Mariotti, M., Reed, D., Petit, J.-C. & Lefrere, J.-J. (1995) Correlation between viral DNA load and serum anti p19 antibody concentration in symptomless human T-lymphotropic virus type-I (HTLV-I)-infected individuals. *Int. J. Cancer*, **60**, 156–159
- Mori, N., Murakami, S., Oda, S., Prager, D. & Eto, S. (1995) Production of interleukin 8 in adult T-cell leukemia cells: possible transactivation of the interleukin 8 gene by human T-cell leukemia virus type I *tax*. *Cancer Res.*, **55**, 3592–3597
- Morofuji-Hirata, M., Kajiyama, W., Nakashima, K., Noguchi, A., Hayashi, J. & Kashiwagi, S. (1993) Prevalence of antibody to human T-cell lymphotropic virus type I in Okinawa, Japan, after an interval of 9 years. *Am. J. Epidemiol.*, **137**, 43–48
- Mueller, N. (1991) The epidemiology of HTLV-I infection. *Cancer Causes Control*, **2**, 37–52
- Mueller, N.E. & Blattner, W.A. (1996) Retroviruses: HTLV. In: Evans, A.S. & Kaslow, R., eds, *Viral Infections of Humans: Epidemiology and Control*, 4th Ed., New York, Plenum Medical Press (in press)
- Mukae, H., Kohno, S., Morikawa, N., Kadota, J.-I., Matsukura, S. & Hara, K. (1994) Increase in T-cells bearing CD25 in bronchoalveolar lavage fluid from HAM/TSP patients and HTLV-I carriers. *Microbiol. Immunol.*, **38**, 55–62
- Mulloy, J.C., Boeri, E., Gallo, R.C., Leonard, W.J. & Franchini, G. (1994) The HTLV-I p12ⁱ protein binds to the immature forms of the IL-2 receptor β - and γ -chains: possible implication in IL2-R signalling (Abstract). *AIDS Res. hum. Retroviruses*, **10**, 443
- Murai, K., Tachibana, N., Shioiri, S., Shishime, E., Okayama, A., Ishizaki, J., Tsuda, K. & Mueller, N. (1990) Suppression of delayed-type hypersensitivity to PPD and PHA in elderly HTLV-I carriers. *J. acquir. Immune Defic. Syndr.*, **3**, 1006–1009
- Murakami, K., Okada, K., Ikawa, Y. & Aida, Y. (1994a) Bovine leukemia virus induces CD5⁻ B cell lymphoma in sheep despite temporarily increasing CD5⁺ B cells in asymptomatic stage. *Virology*, **202**, 458–465
- Murakami, K., Aida, Y., Kageyama, R., Numakunai, S., Ohshima, K., Okada, K. & Ikawa, Y. (1994b) Immunopathologic study and characterization of the phenotype of transformed cells in sheep with bovine leukemia virus-induced lymphosarcoma. *Am. J. vet. Res.*, **55**, 72–80
- Murphy, E.L., Figueroa, J.P., Gibbs, W.N., Brathwaite, A., Holding-Cobham, M., Waters, D., Cranston, B., Hanchard, B. & Blattner, W.A. (1989a) Sexual transmission of human T-lymphotropic virus type I (HTLV-I). *Ann. intern. Med.*, **111**, 555–560

- Murphy, E.L., Hanchard, B., Figueroa, J.P., Gibbs, W.N., Lofters, W.S., Campbell, M., Goedert, J.J. & Blattner, W.A. (1989b) Modelling the risk of adult T-cell leukemia/lymphoma in persons infected with human T-lymphotropic virus type I. *Int. J. Cancer*, **43**, 250–253
- Murphy, E.L., Figueroa, J.P., Gibbs, W.N., Holding-Cobham, M., Cranston, B., Malley, K., Bodner, A.J., Alexander, S.S. & Blattner, W.A. (1991) Human T-lymphotropic virus type I (HTLV-I) seroprevalence in Jamaica. I. Demographic determinants. *Am. J. Epidemiol.*, **133**, 1114–1124
- Murphy, E.L., Engstrom, J.W., Miller, K., Sacher, R.A., Busch, M.P., Hollingsworth, C.G. and the REDS (Retrovirus Epidemiology in Blood Donor Study) Investigators (1993) HTLV-II associated myelopathy in 43-year-old woman (Letter to the Editor). *Lancet*, **341**, 757–758
- Murphy, E.L., Smith, J.W., Sacher, R.A., Gible, J., Thomson, B., Kaplan, J., Nemo, G., Friley, J., Engstrom, J., Miller, K., Stevens, J., Hansma, D., Khabbaz, R. & the REDS Investigators (1996) HTLV-associated myelopathy in a cohort of HTLV-I and HTLV-II infected blood donors. *Neurology* (in press)
- Myers, G., Korber, B., Wain-Hobson, S., Smith, R.F. & Pavlakis, G.N. (1993) *Human retroviruses and AIDS*, Los Alamos, NM, Los Alamos National Laboratory
- Nagashima, K., Yoshida, M. & Seiki, M. (1986) A single species of *pX* mRNA of human T-cell leukemia virus type I encodes *trans*-activator p40^x and two other phosphoproteins. *J. Virol.*, **60**, 394–399
- Nakada, K., Yamaguchi, K., Furugen, S., Nakasone, T., Nakasone, K., Oshiro, Y., Kohakura, M., Hinuma, Y., Seiki, M., Yoshida, M., Matutes, E., Catovsky, D., Ishi, T. & Takatsuki, K. (1987) Monoclonal integration of HTLV-I proviral DNA in patients with strongyloidiasis. *Int. J. Cancer.*, **40**, 145–148
- Nakamura, H., Tanaka, Y., Komuro-Tsujimoto, A., Ishikawa, K., Takadaya, K.I., Tozawa, H., Tsujimoto, H., Honjo, S. & Hayami, M. (1986) Experimental inoculation of monkeys with autologous lymphoid cell lines immortalized by and producing human T-cell leukemia virus type-I. *Int. J. Cancer*, **38**, 867–875
- Nakamura, H., Hayami, M., Ohta, Y., Ishikawa, K.-I., Tsujimoto, H., Kiyokawa, T., Yoshida, M., Sasagawa, A. & Honjo, S. (1987) Protection of cynomolgus monkeys against infection by human T-cell leukaemia virus type I by immunization with viral *env* gene products produced in *Escherichia coli*. *Int. J. Cancer*, **40**, 403–407
- Nakao, K., Ohba, N., Otsuka, S., Okubo, A., Yanagita, T., Hashimoto, N. & Arimura, H. (1994) HTLV-I associated uveitis and hyperthyroidism. *Jpn. J. Ophthalmol.*, **38**, 56–61
- Nakashima, M., Itagaki, A., Yamada, O., Hagari, S., Furukawa, A., Kamahora, T., Shiraki, K. & Kurimura, T. (1990) Evidence against a seronegative HTLV-I carrier rate among children (Letter to the Editor). *AIDS Res. hum. Retroviruses*, **6**, 1057–1058
- Nakashima, K., Kashiwagi, S., Kajiyama, W., Hirata, M., Hayashi, J., Noguchi, A., Urabe, K., Minami, K. & Maeda, Y. (1995) Sexual transmission of human T-lymphotropic virus type I among female prostitutes and among patients with sexually transmitted diseases in Fukuoka, Kyushu, Japan. *Am. J. Epidemiol.*, **141**, 305–311
- Neel, J.V., Biggar, R.J. & Sukernik, R.I. (1994) Virologic and genetic studies relate Amerind origins to the indigenous people of the Mongolia/Manchuria/southeastern Siberia region. *Proc. natl Acad. Sci. USA*, **91**, 10737–10741
- Nelson, B.H., Lord, J.D. & Greenberg, P.D. (1994) Cytoplasmic domains of the interleukin-2 receptor β and γ chains mediate the signal for T-cell proliferation. *Nature*, **369**, 333–336

- Nerenberg, M.I. & Wiley, C.A. (1989) Degeneration of oxidative muscle fibers in HTLV-I transgenic mice. *Am. J. Pathol.*, **135**, 1025–1033
- Nerenberg, M.I., Hinrichs, S.H., Reynolds, R.K., Khoury, G. & Jay, G. (1987) The *tat* gene of human T-lymphotropic virus type I induces mesenchymal tumors in transgenic mice. *Science*, **237**, 1324–1329
- Nerenberg, M.I., Minor, T., Price, J., Ernst, D.N., Shinohara, T. & Schwarz, H. (1991) Transgenic thymocytes are refractory to transformation by the human T-cell leukemia virus type I *tax* gene. *J. Virol.*, **65**, 3349–3353
- Nerurkar, V.R., Miller, M.A., Leon-Monzon, M.E., Ajdukiewicz, A.B., Jenkins, C.L., Sanders, R.C., Godec, M.S., Garruto, R.M. & Yanagihara, R. (1992) Failure to isolate human T cell lymphotropic virus type I and to detect variant-specific genomic sequences by polymerase chain reaction in Melanesians with indeterminate western immunoblot. *J. gen. Virol.*, **73**, 1805–1810
- Nerurkar, V.R., Achiron, A., Song, K.-J., Melland, R.R., Pinhas-Hamiel, O., Melamed, E., Shohat, B. & Yanagihara, R. (1995) Human T-cell lymphotropic virus type I in Iranian-born Mashhadi Jews: genetic and phylogenetic evidence for common source of infection. *J. med. Virol.*, **45**, 361–366
- Nicot, C., Astier-Gin, T., Edouard, E., Legrand, E., Moynet, D., Vital, A., Londos-Gagliardi, D., Moreau, J.P. & Guillemain, B. (1993) Establishment of HTLV-I infected cell lines from French, Guianese and West Indian patients and isolation of a proviral clone producing viral particles. *Virus Res.*, **30**, 317–334
- Niewiesk, S., Daenke, S., Parker, C.E., Taylor, G., Weber, J., Nightingale, S. & Bangham, C.R.M. (1994) The transactivator gene of human T-cell leukemia virus type I is more variable within and between healthy carriers than patients with tropical spastic paraparesis. *J. Virol.*, **68**, 6778–6781
- Niewiesk, S., Daenke, S., Parker, C.E., Taylor, G., Weber, J., Nightingale, S. & Bangham, C.R.M. (1995) Naturally occurring variants of human T-cell leukaemia virus type I Tax protein impair its recognition by cytotoxic T lymphocytes and the transactivation function of Tax. *J. Virol.*, **69**, 2649–2653
- Nishimura, Y., Takenaka, H., Yoshidome, K., Iwase, K., Oshima, S. & Tanaka, T. (1994) Primary mesenteric tumor of adult T-cell leukemia/lymphoma: report of a case. *Jpn. J. Surg.*, **24**, 263–267
- Nishioka, K., Maruyama, I., Sato, K., Kitajima, I., Nakajima, Y. & Osame, M. (1989) Chronic inflammatory arthropathy associated with HTLV-I (Letter to the Editor). *Lancet*, **i**, 441
- Nishioka, K., Nakajima, T., Hasunuma, T. & Sato, K. (1993) Rheumatic manifestation of human leukemia virus infection. *Rheum. Dis. Clin. N. Am.*, **19**, 489–503
- Nomura, A.M.Y., Yanagihara, E.T., Blattner, W.A., Ho, G.Y.F., Inamasu, M.S., Severson, R.K. & Nakamura, J.M. (1990) Human T-cell lymphotropic virus type I (HTLV-I) antibodies in pre-diagnostic serum of patients with familial adult T-cell leukemia/lymphoma (ATL). *Hematol. Oncol.*, **8**, 169–176
- Nosaka, T., Ariumi, Y., Sakurai, M., Takeuchi, R. & Hatanaka, M. (1993) Novel internal promoter/enhancer of HTLV-I for Tax expression. *Nucleic Acids Res.*, **21**, 5124–5129
- Oguma, S. (1990) Simulation of dynamic changes of human T-cell leukemia virus type I carriage rates. *Jpn. J. Cancer Res.*, **81**, 15–21

- Oguma, S., Imamura, Y., Kusumoto, Y., Nishimura, Y., Yamaguchi, K., Takatsuki, K., Tokudome, S. & Okuma, M. (1992) Accelerated declining tendency of human T-cell leukemia virus type I carrier rates among younger blood donors in Kumamoto, Japan. *Cancer Res.*, **52**, 2620–2623
- Oguma, S., Imamura, Y., Kusumoto, Y., Nishimura, Y., Yamaguchi, K., Takatsuki, K. & Okuma, M. (1995) Stable human T-lymphotropic virus type I carrier rates for 7 years among a teenaged blood donor cohort of 1986 in Kumamoto, Japan. *Leuk. Res.*, **19**, 567–571
- Ohba, N., Nakao, K., Isashiki, Y., Osame, M., Sonoda, S., Yashiki, S., Yamaguchi, K., Tajima, K. and the Study Group for HTLV-I Associated Ocular Diseases (1994) A multicenter case-control study of HTLV-I associated uveitis. *Jpn. J. Ophthalmol.*, **38**, 162–167
- Ohguro, S., Himi, T., Harabuchi, Y., Suzuki, T., Asakura, K. & Kataura, A. (1993) Adult T-cell leukaemia-lymphoma in Waldeyer's ring: a report of three cases. *J. Laryngol. Otol.*, **107**, 960–962
- Ohishi, K., Suzuki, H., Yamamoto, T., Maruyama, T., Miki, K., Ikawa, Y., Numakunai, S., Okada, K., Ohshima, K.-I. & Sugimoto, M. (1991) Protective immunity against bovine leukemia virus (BLV) induced in carrier sheep by inoculation with a vaccinia virus-BLV *env* recombinant: association with cell-mediated immunity. *J. gen. Virol.*, **72**, 1887–1892
- Ohshima, K.-I., Kikuchi, M., Yoshida, T., Masuda, Y.-I. & Kimura, N. (1991a) Lymph nodes in incipient adult T-cell leukemia-lymphoma with Hodgkin's disease-like histological features. *Cancer*, **67**, 1622–1628
- Ohshima, T., Aida, Y., Kim, J.-C., Okada, K., Chiba, T., Murakami, K. & Ikawa, Y. (1991b) Histopathology and distribution of cells harboring bovine leukemia virus (BLV) proviral sequences in ovine lymphosarcoma induced by BLV inoculation. *J. vet. med. Sci.*, **53**, 191–199
- Ohsugi, T., Ishibashi, K., Shingu, M. & Nomura, T. (1994) Engraftment of HTLV-I-transformed human T-cell line into SCID mice with NK cell function. *J. vet. med. Sci.*, **56**, 601–603
- Ohtsu, T., Tsugane, S., Tobinai, K., Shimoyama, M., Nanri, S. & Watanabe, S. (1987) Prevalence of antibodies to human T-cell leukemia/lymphoma virus type I and human immunodeficiency virus in Japanese immigrant colonies in Bolivia and Bolivian natives. *Jpn. J. Cancer Res. (Gann)*, **78**, 1347–1353
- Okayama, A., Maruyama, T., Tachibana, N., Hayashi, K., Kitamura, T., Mueller, N. & Tsubouchi, H. (1995) Increased prevalence of HTLV-I infection in patients with hepatocellular carcinoma associated with hepatitis C virus. *Jpn. J. Cancer Res.*, **86**, 1–4
- Okochi, K., Sato, H. & Hinuma, Y. (1984) A retrospective study on transmission of adult T cell leukemia virus by blood transfusion: seroconversion in recipients. *Vox Sang.*, **46**, 245–253
- Ono, K., Shimamoto, Y., Suga, K., Tokioka, T., Sueoka, E., Matsuzaki, M., Sano, M., Yamaguchi, M., Suzuki, H., Sato, H. & Shimoyama, M. (1989) Cancer superimposed on adult T-cell leukemia. *Cancer*, **64**, 635–640
- Ono, A., Miura, T., Araki, S., Yamaguchi, K., Takatsuki, K., Mori, S., Hayami, M., Mochizuki, M. & Watanabe, R. (1994) Subtype analysis of HTLV-I in patients with HTLV-I uveitis. *Jpn. J. Cancer Res.*, **85**, 767–770
- Orita, S., Saiga, A., Takagi, S., Tanaka, I., Okumura, K., Aono, Y., Hinuma, Y. & Igarashi, H. (1991) A novel alternatively spliced viral mRNA transcribed in cells infected with human T-cell leukaemia virus type I is mainly responsible for expressing p21X protein. *FEBS Lett.*, **295**, 127–134

- Orita, S., Sato, S., Aono, Y., Minoura, N., Yamashita, T., Hinuma, Y. & Igarashi, H. (1993) Identification of novel singly spliced pX mRNA transcripts common to all human T-cell leukemia virus type I-related retroviruses. *Virus Genes*, **7**, 197–204
- Osame, M., Usuku, K., Izumo, S., Ijichi, N., Amitani, H., Igata, A., Matsumoto, M. & Tara, M. (1986a) HTLV-I associated myelopathy, a new clinical entity (Letter to the Editor). *Lancet*, **i**, 1031–1032
- Osame, M., Izumo, S., Igata, A., Matsumoto, M., Matsumoto, T., Sonoda, S., Tara, M. & Shibata, Y. (1986b) Blood transfusion and HTLV-I associated myelopathy (Letter to the Editor). *Lancet*, **ii**, 104–105
- Osame, M., Janssen, R., Kubota, H., Nishitani, H., Igata, A., Nagataki, S., Mori, M., Goto, I., Shimabukuro, H., Khabbaz, R. & Kaplan, J. (1990) Nationwide survey of HTLV-I-associated myelopathy in Japan: association with blood transfusion. *Ann. Neurol.*, **28**, 50–56
- Ouattara, S.A., Gody, M. & de Thé, G. (1989) Prevalence of HTLV-I compared to HIV-1 and HIV-2 antibodies in different groups in the Ivory Coast (West Africa). *J. acquir. immune Defic. Syndr.*, **2**, 481–485
- Paca-Uccaralartkun, S., Zhao, L.-J., Adya, N., Cross, J.V., Cullen, B.R., Boros, I.M. & Giam, C.-Z. (1994) In vitro selection of DNA elements highly responsive to the human T-cell lymphotropic virus type I transcriptional activator, Tax. *Mol. cell. Biol.*, **14**, 456–462
- Pagliuca, A., Williams, H., Salisbury, J. & Mufty, G.J. (1990) Prodromal cutaneous lesions in adult T-cell leukaemia/lymphoma (Letter to the Editor). *Lancet.*, **335**, 733–734
- Pan, X.-Z., Qiu, Z.-D., Chein, N., Gold, J.W.M., Hardy, W.D., Jr, Zuckerman, E., Wang, Q.N. & Armstrong, D. (1991) A seroepidemiological survey of HTLV-I infection in Shanghai and Chongqing cities in China. *AIDS*, **5**, 782–783
- Pancake, B.A. & Zucker-Franklin, D. (1993) More on HTLV-I tax and mycosis fungoides. *Lancet*, **329**, 580
- Pancake, B.A., Zucker-Franklin, D. & Coutavas, E.E. (1995) The cutaneous T cell lymphoma, mycosis fungoides, is a human T cell lymphotropic virus-associated disease. A study of 50 patients. *J. clin. Invest.*, **95**, 547–554
- Pandolfi, F., Shriver, K., Scarselli, E., Fiorelli, V., Semenzato, G., Zambello, R., Chisesi, T., De Rossi, G. & Strong, D.M. (1987) HTLV-I antibodies and lymphoproliferative disease of granular lymphocytes (Letter to the Editor). *Lancet*, **ii**, 1527
- Pantazis, P., Sariban, E., Bohan, C.A., Antoniadis, H.N. & Kalyanaraman, V.S. (1987) Synthesis of PDGF by cultured human T-cells transformed with HTLV-I and II. *Oncogene*, **1**, 285–289
- Parker, C.E., Daenke, S.D., Nightingale, S. & Bangham, C.R.M. (1992) Activated HTLV-I-specific cytotoxic T lymphocytes are found in healthy seropositives as well as in patients with tropical spastic paraparesis. *Virology*, **188**, 628–636
- Parker, C.E., Nightingale, S., Taylor, G.P., Weber, J. & Bangham, C.R.M. (1994) Circulating anti-Tax cytotoxic T lymphocytes from human T-cell leukemia virus type I-infected people, with and without tropical spastic paraparesis, recognize multiple epitopes simultaneously. *J. Virol.*, **68**, 2860–2868
- Parodi, A.-L. (1987) Pathology of enzootic bovine leukosis. Comparison with the sporadic form. In: Burny, A. & Mammerickx, M., eds, *Enzootic Bovine Leukosis and Bovine Leukemia Virus*, Boston, Martinus Nijhoff Publishing, pp. 15–49

- Parodi, A.-L., Mialot, M., Crespeau, F., Lévy, D., Salmon, H., Noguès, G. & Gérard-Marchand, R. (1982) Attempt for a new cytological and cytoimmunological classification of bovine malignant lymphoma (BML) (lymphosarcoma). In: Straub, O.C., ed., *Fourth International Symposium on Bovine Leukosis*, Brussels-Luxembourg, European Union, pp. 561–570
- Parry, C.M., Harries, A.D., Beeching, N.J., Shaw, I.M., Mutton, K.J., McAlpine, L., Tosswill, J.H., Tuke, P.W. & Garson, J.A. (1991) HTLV-II infection in a Liverpool intravenous drug user (Letter to the Editor). *J. infect. Dis.*, **23**, 337–339
- Patey, O., Gessain, A., Breuil, J., Courillon-Mallet, A., Daniel, M.-T., Miclea, J.-M., Roucayrol, A.-M., Sigaux, F. & Lafaix, C. (1992) Seven years of recurrent severe strongyloidiasis in an HTLV-I-infected man who developed adult T-cell leukaemia. Short communication. *AIDS*, **6**, 575–579
- Paul, P.S., Pomeroy, K.A., Castro, A.E., Johnson, D.W., Muscoplat, C.C. & Sorensen, D.K. (1977) Detection of bovine leukemia virus in B-lymphocytes by the syncytia induction assay. *J. natl Cancer Inst.*, **59**, 1269–1272
- Paul, N.L., Millet, I. & Ruddle, N.H. (1993) The lymphotoxin promoter is stimulated by HTLV-I tax activation of NF- κ B in human T-cell lines. *Cytokine*, **5**, 372–378
- Paun, L., Ispas, O., Del Mistro, A. & Chieco-Bianchi, L. (1994) HTLV-I in Romania (Letter to the Editor). *Eur. J. Haematol.*, **52**, 117–118
- Peebles, R.S., Maliszewski, C.R., Sato, T.A., Hanley-Hyde, J., Maroulakou, I.G., Hunziker, R., Schneck, J.P. & Green, J.E. (1995) Abnormal B-cell function in HTLV-I-tax transgenic mice. *Oncogene*, **10**, 1045–1051
- Perini, G., Wagner, S. & Green, M.R. (1995) Recognition of bZIP proteins by the human T-cell leukaemia virus transactivator Tax. *Nature*, **376**, 602–605
- Persaud, D., Muñoz, J.L., Tarsis, S.L., Parks, E.S. & Parks, W.P. (1995) Time course and cytokine dependence of human T-cell lymphotropic virus type I T-lymphocyte transformation as revealed by a microtiter infectivity assay. *J. Virol.*, **69**, 6297–6303
- Petti, L., Nilson, L.A. & DiMaio, D. (1991) Activation of the platelet-derived growth factor receptor by the bovine papillomavirus E5 transforming protein. *EMBO J.*, **10**, 845–855
- Phels, K.R., Ginsberg, S.S., Cunningham, A.W., Tschachler, E. & Dosik, H. (1991) Case report: adult T-cell leukaemia/lymphoma associated with recurrent strongyloides hyperinfection. *Am. J. med. Sci.*, **302**, 224–228
- Picard, F., Dreyfus, F., Le Guern, M., Tulliez, M., d'Auriol, L., Neron, S., Galibert, F., Saragosti, S. & Varet, B. (1990) Adult T-cell leukemia/lymphoma mimicking Hodgkin's disease with secondary HTLV-I seroconversion. *Cancer*, **66**, 1524–1528
- Pillonel, J., Lemaire, J.M. & Courouge, A.M. (1994) Epidemiology of HTLV in blood donors resident in metropolitan France (July 1991–June 1993). *Méd. Mal. infect.*, **24**, 548–552 (in French)
- Plumelle, Y., Pascaline, N., Nguyen, D., Panelatti, G., Jouannelle, A., Jouault, H. & Imbert, M. (1993) Adult T-cell leukemia-lymphoma: a clinico-pathologic study of twenty six patients from Martinique. *Hematol. Pathol.*, **7**, 251–262
- Poiesz, B.J., Ruscetti, F.W., Gazdar, A.F., Bunn, P.A., Minna, J.D. & Gallo, R.C. (1980) Detection and isolation of type C retrovirus particles from fresh and cultured lymphocytes of a patient with cutaneous T-cell lymphoma. *Proc. natl Acad. Sci. USA*, **77**, 7415–7419

- Pombo de Oliveira, M.S., Matutes, E., Famadas, L.C., Schultz, T.F., Calabro, M.L., Nucci, M., Andrada-Serpa, M.J., Tedder, R.S., Weiss, R.A. & Catovsky, D. (1990) Adult T-cell leukaemia/lymphoma in Brazil and its relation to HTLV-I. *Lancet*, **336**, 987–990
- Pombo de Oliveira, M.S., Matutes, E., Schulz, T., Carvalho, S.M., Noronha, H., Reaves, J.D., Loureiro, P., Machado, C. & Catovsky, D. (1995) T-cell malignancies in Brazil. Clinico-pathological and molecular studies of HTLV-I positive and negative cases. *Int. J. Cancer*, **60**, 823–827
- Popovic, M., Lange-Wantzin, G., Sarin, P.S., Mann, D. & Gallo, R.C. (1983) Transformation of human umbilical cord blood T cells by human T-cell leukemia/lymphoma virus. *Proc. natl Acad. Sci. USA*, **80**, 5402–5406
- Portetelle, D., Limbach, K., Burny, A., Mammerickx, M., Desmettre, P., Riviere, M., Zavada, J. & Paoletti, E. (1991) Recombinant vaccinia virus expression of the bovine leukemia virus envelope gene and protection of immunized sheep against infection. *Vaccine*, **9**, 194–200
- Powers, M.A. & Radke, K. (1992) Activation of bovine leukemia virus transcription in lymphocytes from infected sheep: rapid transition through early to late gene expression. *J. Virol.*, **66**, 4769–4777
- Pozzatti, R., Vogel, J. & Jay, G. (1990) The human T-lymphotropic virus type I *tax* gene can cooperate with the *ras* oncogene to induce neoplastic transformation of cells. *Mol. cell. Biol.*, **10**, 413–417
- Ramiandrisoa, H., Dumas, M., Giordano, C., N'Diaye, I.P., Grunitzky, E.K., Kabore, J., Verdier, M., Diop, G., N'Diaye, M. & Denis, F. (1991) Human retrovirus HTLV-I, HIV-1, HIV-2 and neurological diseases in West Africa. *J. trop. geogr. Neurol.*, **1**, 39–44
- Ramirez, P.H., Jimenez, R.R., Santovenia, M.B., Leyva, L.N., Matutes, E., Catovsky, D., Yamaguchi, K., Fukuyoshi, Y., Nishimura, Y., Kiyokawa, T. & Takatsuki, K. (1991) Very low seroprevalence of HTLV-I/II in Cuba: antibodies in blood donors and in hematological and nonhematological patients. *Vox Sang.*, **61**, 277–278
- Ratner, L., Josephs, S.F., Starcich, B., Hahn, B., Shaw, G.M., Gallo, R.C. & Wong-Staal, F. (1985) Nucleotide sequence analysis of a variant human T-cell leukemia virus (HTLV-Ib) provirus with a deletion in pX-I. *J. Virol.*, **54**, 781–790
- Reid, R.L., Lindholm, P.F., Mireskandari, A., Dittmer, J. & Brady, J.N. (1993) Stabilization of wild-type p53 in human T-lymphocytes transformed by HTLV-I. *Oncogene*, **8**, 3029–3036
- Richardson, J.H., Edwards, A.J., Cruickshank, J.K., Rudge, P. & Dalgleish, A.G. (1990) In vivo cellular tropism of human T-cell leukemia virus type I. *J. Virol.*, **64**, 5682–5687
- Riedel, D.A., Evans, A.S., Saxinger, C. & Blattner, W.A. (1989) A historical study of human T lymphotropic virus type I transmission in Barbados. *J. infect. Dis.*, **159**, 603–609
- Rio, B., Louvet, C., Gessain, A., Dormont, D., Gisselbrecht, C., Martoia, R., Auzanneau, G., Miclea, J.M., Baumelou, E., Dombret, H., Guillevin, L., Patey, O., K'Ple Faget, P. & Zittoun, R. (1990) Adult T-cell leukaemia and non-malignant adenopathies associated with HTLV-I virus. On 17 patients born in the Caribbean region and Africa. *Presse méd.*, **19**, 746–751 (in French)
- Robert-Guroff, M., Ruscetti, F.W., Posner, L.E., Poiesz, B.J. & Gallo, R.C. (1981) Detection of the human T cell lymphoma virus p19 in cells of some patients with cutaneous T cell lymphoma and leukemia using a monoclonal antibody. *J. exp. Med.*, **154**, 1957–1964
- Robert-Guroff, M., Clark, J., Lanier, A.P., Beckman, G., Melbye, M., Ebbesen, P., Blattner, W.A. & Gallo, R.C. (1985) Prevalence of HTLV-I in arctic regions. *Int. J. Cancer*, **36**, 651–655

- Roberts, B.D., Fong, S.K.H., Lipka, J.J., Kaplan, J.E., Hadlock, K.G., Reyes, G.R., Chan, L., Heneine, W. & Khabbaz, R.F. (1993) Evaluation of an immunoblot assay for serological confirmation and differentiation of human T-cell lymphotropic virus types I and II. *J. clin. Microbiol.*, **31**, 260–264
- Rodgers-Johnson, P.E.B. (1994) Tropical spastic paraparesis/HTLV-I associated myelopathy. Etiology and clinical spectrum. *Mol. Neurobiol.*, **8**, 175–179
- Rodgers-Johnson, P.E.B., Gajdusek, D.C., St Clair Morgan, O., Zaninovic, V., Sarin, P.S. & Graham, D.S. (1985) HTLV-I and HTLV-III antibodies and tropical spastic paraparesis (Letter to the Editor). *Lancet*, **ii**, 1247–1248
- Rodgers-Johnson, P.E.B., St Clair Morgan, O., Mora, C., Sarin, P., Ceroni, M., Piccardo, P., Garruto, R.M., Gibbs, C.J., Jr & Gajdusek, D.C. (1988) The role of HTLV-I in tropical spastic paraparesis in Jamaica. *Ann. Neurol.*, **23** (Suppl.), S121–S126
- Roithmann, S., Pique, C., Le Cesne, A., Delamarre, L., Pham, D., Tursz, T. & Dokh  lar, M.-C. (1994) The open reading frame I (ORF I)/ORF II part of the human T-cell leukemia virus type I X region is dispensable for p40^{tax}, p27^{tax}, or envelope expression. *J. Virol.*, **68**, 3448–3451
- Rom  n, G.C., Schoenberg, B.S., Madden, D.L., Sever, J.L., Hugon, J., Ludolph, A. & Spencer, P.S. (1987) Human T-lymphotropic virus type I antibodies in the serum of patients with tropical spastic paraparesis in the Seychelles. *Arch. Neurol.*, **44**, 605–607
- Rosenblatt, J.D., Golde, D.W., Wachsman, W., Giorgi, J.V., Jacobs, A., Schmidt, G.M., Quan, S., Gasson, J.C. & Chen, I.S.Y. (1986) A second isolate of HTLV-II associated with atypical hairy-cell leukemia. *New Engl. J. Med.*, **315**, 372–377
- Rosenblatt, J.D., Gasson, J.C., Glaspy, J., Bhuta, S., Aboud, M., Chen, I.S. & Golde, D.W. (1987) Relationship between human T cell leukemia virus-II and atypical hairy cell leukemia: a serologic study of hairy cell leukemia patients. *Leukemia*, **1**, 397–401
- Rosenblatt, J.D., Giorgi, J.V., Golde, D.W., Ben Ezra, J., Wu, A., Winberg, C.D., Glaspy, J., Wachsman, W. & Chen, I.S.Y. (1988a) Integrated human T-cell leukemia virus II genome in CD8⁺ T cells from a patient with ‘atypical’ hairy cell leukemia: evidence for distinct T and B cell lymphoproliferative disorders. *Blood*, **71**, 363–369
- Rosenblatt, J.D., Chen, I.S.Y. & Golde, D.W. (1988b) HTLV-II and human lymphoproliferative disorders. *Clin. Lab. Med.*, **8**, 85–95
- Rovnak, J., Boyd, A.L., Casey, J.W., Gonda, M.A., Jensen, W.A. & Cockerell, G.L. (1993) Pathogenicity of molecularly cloned bovine leukemia virus. *J. Virol.*, **67**, 7096–7105
- Ruddle, N.H., Li, C.-B., Horne, W.C., Santiago, P., Troiano, N., Jay, G., Horowitz, M. & Baron, R. (1993) Mice transgenic for HTLV-I LTR-*tax* exhibit Tax expression in bone, skeletal alterations, and high bone turnover. *Virology*, **197**, 196–204
- Rudolph, D.L., Keesling, S.S., Lerche, N., Yee, J.A. & Lal, R.B. (1991) Dominance of HTLV type I-specific antibody responsiveness in Old World monkeys. *AIDS Res. hum. Retroviruses*, **7**, 721–722
- Rudolph, D.L., Khabbaz, R.F., Folks, T.M. & Lal, R.B. (1993) Detection of human T-lymphotropic virus type-I/II *env* antibodies by immunoassays using recombinant fusion proteins. *Diag. microbiol. infect. Dis.*, **17**, 35–39
- Rudolph, D.L., Coligan, J.E. & Lal, R.B. (1994) Detection of antibodies to *trans*-activator protein (p40^{tax}) of human T-lymphotropic virus type-I by a synthetic peptide-based assay. *Clin. Diag. Lab. Immunol.*, **1**, 176–181

- Sagawa, K., Mochizuki, M., Masuoka, K., Katagiri, K., Katayama, T., Maeda, T., Tanimoto, A., Sugita, S., Watanabe, T. & Itoh, K. (1995) Immunopathological mechanisms of human T cell lymphotropic virus type I (HTLV-I) uveitis. Detection of HTLV-I-infected T cells in the eye and their constitutive cytokine production. *J. clin. Invest.*, **95**, 852–858
- Saggioro, D., Majone, F., Forino, M., Turchetto, L., Leszl, A. & Chieco-Bianchi, L. (1994) Tax protein of human T-lymphotropic virus type I triggers DNA damage. *Leuk. Lymph.*, **12**, 281–286
- Sakai, M., Eguchi, K., Terada, K., Nakashima, M., Yamashita, I., Ida, H., Kawabe, Y., Aoyagi, T., Takino, H., Nakamura, T. & Nagatika, S. (1993) Infection of human synovial cells by human T cell lymphotropic virus type I. Proliferation and granulocyte/macrophage colony-stimulating factor production by synovial cells. *J. clin. Invest.*, **92**, 1957–1966
- Sakakibara, I., Sugimoto, Y., Sasagawa, A., Honjo, S., Tsujimoto, H., Nakamura, H. & Hayami, M. (1986) Spontaneous malignant lymphoma in an African green monkey naturally infected with simian T-lymphotropic virus (STLV). *J. med. Primatol.*, **15**, 311–318
- Sakamoto, Y., Kawachi, Y., Uchida, Y., Abe, T. & Mori, M. (1994) Adult T-cell leukaemia/lymphoma featuring a large granular lymphocyte leukaemia morphologically. *Br. J. Haematol.*, **86**, 383–385
- Sakashita, A., Hattori, T., Miller, C.W., Suzushima, H., Asou, N., Takatsuki, K. & Koeffler, H.P. (1992) Mutations of the p53 gene in adult T-cell leukemia. *Blood*, **79**, 477–480
- Saksena, N., Herve, V., Durand, J.P., Mathiot, C., Love, J., Saksena, M., Barre-Sinoussi, F. & Poiesz, B. (1994) Experimental intraspecies transmission of STLV-I into non-human primates (Abstract no. A-106). *AIDS Res. hum. Retroviruses*, **10**, 458
- Salazar-Gruesso, E.F., Holzer, T.J., Gutierrez, R.A., Casey, J.M., Desai, S.M., Devare, S.G., Dawson, G. & Roos, R.P. (1990) Familial spastic paraparesis syndrome associated with HTLV-I infection. *New Engl. J. Med.*, **323**, 732–737
- Salker, R., Tosswill, J.H.C., Barbara, J.A.J., Runganga, J., Contreras, M., Tedder, R.S., Parra-Mejia, N. & Mortimer, P.P. (1990) HTLV-I/II antibodies in UK blood donors (Letter to the Editor). *Lancet*, **336**, 317
- Sandler, S.G., Fang, C.T. & Williams, A.E. (1991) Human T-cell lymphotropic virus type I and II in transfusion medicine. *Transfus. med. Rev.*, **5**, 93–107
- Sato, H. & Okochi, K. (1990) Transmission of HTLV-I through blood transfusion and its prevention. *Hematol. Rev.*, **3**, 235–245
- Sawada, T., Tohmatsu, J., Obara, T., Koide, A., Kamihira, S., Ichimaru, M., Kashiwagi, S., Kajiyama, W., Matsumura, N., Kinoshita, K., Yano, M., Yamaguchi, K., Kiyokawa, T., Takatsuki, K., Taguchi, H. & Miyoshi, I. (1989) High risk of mother-to-child transmission of HTLV-I in p40^{tax} antibody-positive mothers. *Jpn. J. Cancer Res.*, **80**, 506–508
- Sawada, M., Suzumura, A., Yoshida, M. & Marunouchi, T. (1990) Human T-cell leukemia virus type I *trans* activator induces class I major histocompatibility complex antigen expression in glial cells. *J. Virol.*, **64**, 4002–4006
- Sawada, M., Suzumura, A., Kondo, N. & Marunouchi, T. (1992) Induction of cytokines in glial cells by *trans* activator of human T-cell lymphotropic virus type I. *FEBS Lett.*, **313**, 47–50
- Saxinger, W., Blattner, W.A., Levine, P.H., Clark, J., Biggar, R., Hoh, M., Moghissi, J., Jacobs, P., Wilson, L., Jacobson, R., Crookes, R., Strong, M., Ansari, A.A., Dean, A.G., Nkrumah, F.K., Murali, N. & Gallo, R.C. (1984) Human T-cell leukemia virus (HTLV-I) antibodies in Africa. *Science*, **225**, 1473–1476

- Schaffar-Deshayes, L., Chavance, M., Monplaisir, N., Courouce, A.-M., Gessain, A., Blesonski, S., Valette, I., Feingold, N. & Levy, J.-P. (1984) Antibodies to HTLV-I p24 in sera of blood donors, elderly people and patients with hemopoietic diseases in France and in French West Indies. *Int. J. Cancer*, **34**, 667–670
- Schechter, M., Harrison, L.H., Halsey, N.A., Trade, G., Santino, M., Moulton, L.H. & Quinn, T.C. (1994) Coinfection with human T-cell lymphotropic virus type I and HIV in Brazil. Impact on markers of HIV disease progression. *J. Am. med. Assoc.*, **271**, 353–357
- Schlegel, R., Wade-Glass, M., Rabson, M.S. & Yang, Y.-C. (1986) The E5 transforming gene of bovine papillomavirus encodes a small, hydrophobic polypeptide. *Science*, **233**, 464–467
- Schrijvers, D., Delaporte, E., Peeters, M., Dupont, A. & Meheus, A. (1991) Seroprevalence of retroviral infection in women with different fertility statuses in Gabon, Western Equatorial Africa. *J. acquir. Immune Defic. Syndr.*, **4**, 468–470
- Schwartz, I. & Lévy, D. (1994) Pathobiology of bovine leukemia virus. *Vet. Res.*, **25**, 521–536
- Schwebke, J., Calsyn, D., Shriver, K., Saxon, A., Kleyn, J., Oluoch-Mitchell, E., Olmsted, L., Fisher, L.D., Krone, M., Ashley, R., Stamm, W., Swenson, P. & Holmes, K.K. (1994) Prevalence and epidemiologic correlates of human T cell lymphotropic virus infection among intravenous drug users. *J. infect. Dis.*, **169**, 962–967
- Seiki, M., Hattori, S., Hirayama, Y. & Yoshida, M. (1983) Human adult T-cell leukemia virus: complete nucleotide sequence of the provirus genome integrated in leukemia cell DNA. *Proc. natl Acad. Sci. USA*, **80**, 3618–3622
- Seiki, M., Hikikoshi, A., Taniguchi, T. & Yoshida, M. (1985) Expression of the *pX* gene of HTLV-I: general splicing mechanism in the HTLV family. *Science*, **228**, 1532–1534
- Senjuta, N., Pavlish, O. & Gurtsevitch, V. (1991) Case of adult T-cell leukaemia in HTLV-I infected family in Georgia, USSR (Letter to the Editor). *Lancet*, **338**, 1394
- Seto, A. & Kumagai, K. (1993) Leukemogenesis-associated antigen in HTLV-I transformed rabbit cells. *Leuk. Res.*, **17**, 567–572
- Seto, A., Kawanishi, M., Matsuda, S., Ogawa, K. & Miyoshi, I. (1988) Adult T cell leukemia-like disease experimentally induced in rabbits. *Jpn. J. Cancer Res. (Gann)*, **79**, 335–341
- Setoyama, M., Fujiyoshi, T., Mizoguchi, S., Katahira, Y., Yashiki, S., Tara, M., Kanzaki, T. & Sonoda, S. (1994) HTLV-I messenger RNA is expressed *in vivo* in adult T-cell leukemia/lymphoma patients: an *in situ* hybridization study. *Int. J. Cancer*, **57**, 760–764
- Sherman, M.P., Amin, R.M., Rodgers-Johnson, P.E.B., Morgan, O.S.C., Char, G., Mora, C.A., Iannone, R., Collins, G.H., Papsidero, L., Gibbs, C.J., Jr & Poiesz, B.J. (1995) Identification of human T cell leukemia/lymphoma virus type I antibodies, DNA and protein in patients with polymyositis. *Arthrit. Rheum.*, **38**, 690–698
- Shibasaki, H., Tokudome, S., Kuroda, Y., Yanagawa, T. & Yoshihara, M. (1989) Prevalence of HTLV-I-associated myelopathy among HTLV-I carriers in Saga, Japan. *Neuroepidemiology*, **8**, 124–127
- Shibata, K., Shimamoto, Y., Nakano, S., Miyahara, M., Nakano, H. & Yamaguchi, M. (1995) Mantle cell lymphoma with the features of mucosa-associated lymphoid tissue (MALT) lymphoma in an HTLV-I-seropositive patient. *Ann. Hematol.*, **70**, 47–51
- Shibayama, K., Nakamura, T., Kinoshita, I., Ueki, Y., Nakao, H., Eguchi, K., Tsujihata, M. & Nagataki, S. (1992) Remarkable increase in CD26-positive T-cells in patients with human T lymphotropic virus type I (HTLV-I) associated myelopathy. *Intern. Med.*, **31**, 1081–1083

- Shida, M., Tochikura, T., Sato, T., Konno, T., Hirayoshi, K., Seki, M., Ito, Y., Hatanaka, M., Hinuma, Y., Sugimoto, M., Takahashi-Nishimaki, F., Maruyama, T., Miki, K., Suzuki, K., Morita, M., Sashiyama, H. & Hayami, M. (1987) Effect of the recombinant vaccinia viruses that express HTLV-I envelope gene on HTLV-I infection. *EMBO J.*, **6**, 3379–3384
- Shih, L.-Y., Kuo, T.-T., Dunn, P. & Liaw, S.-J. (1991) Human T-cell lymphotropic virus type I associated adult T-cell leukaemia/lymphoma in Taiwan Chinese. *Br. J. Haematol.*, **79**, 156–161
- Shih, L.-Y., Kuo, T.-T., Dunn, P. & Liaw, S.-J. (1992) HTLV-I-positive and HTLV-I-negative peripheral T-cell lymphomas in Taiwan Chinese. *Int. J. Cancer*, **50**, 186–191
- Shimamoto, Y., Suga, K., Nishimura, J., Nawata, H. & Yamaguchi, M. (1990a) Major prognostic factors of Japanese patients with lymphoma-type adult T-cell leukemia. *Am. J. Hematol.*, **35**, 232–237
- Shimamoto, Y., Suga, K., Shimojo, M., Nishimura, J., Nawata, H. & Yamaguchi, M. (1990b) Comparison of CHOP versus VEPA therapy in patients with lymphoma type of adult T-cell leukemia. *Leuk. Lymph.*, **2**, 335–340
- Shimamoto, Y., Kikuchi, M., Funai, N., Suga, K., Matsuzaki, M. & Yamaguchi, M. (1993) Spontaneous regression in adult T-cell leukemia/lymphoma. *Cancer*, **72**, 735–740
- Shimotohno, K., Takano, M., Teruuchi, T. & Miwa, M. (1986) Requirement of multiple copies of a 21-nucleotide sequence in the *U3* regions of human T-cell leukemia virus type I and type II long terminal repeats for trans-acting activation of transcription. *Proc. natl Acad. Sci. USA*, **83**, 8112–8116
- Shimoyama, M., Kagami, Y., Shimotohno, K., Miwa, M., Minato, K., Tobinai, K., Suemasu, K. & Sugimura, T. (1986) Adult T-cell leukemia/lymphoma not associated with human T-cell leukemia virus type I. *Proc. natl Acad. Sci. USA*, **83**, 4524–4528
- Shimoyama, M., Abe, T., Miyamoto, K., Minato, K., Tobinai, K., Nagoshi, H., Matsunaga, M., Nomura, T., Tsubota, T., Ohnoshi, T., Kimura, I. & Suemasu, K. (1987) Chromosome aberrations and clinical features of adult T-cell leukemia-lymphoma not associated with human T cell leukemia virus type I. *Blood*, **69**, 984–989
- Shimoyama, M. & Members of The Lymphoma Study Group (1984–1987) (1991) Diagnostic criteria and classification of clinical subtypes of adult T-cell leukaemia-lymphoma. *Br. J. Haematol.*, **79**, 428–437
- Shinzato, O., Kamihira, S., Ikeda, S., Kondo, H., Kanda, T., Nagata, Y., Nakayama, E. & Shiku, H. (1993) Relationship between the anti-HTLV-I antibody level, the number of abnormal lymphocytes and the viral-genome dose in HTLV-I-infected individuals. *Int. J. Cancer*, **54**, 208–212
- Sidi, Y., Meytes, D., Shohat, B., Fenig, E., Weisbort, Y., Lee, H., Pinkhas, J. & Rosenblatt, J.D. (1990) Adult T-cell lymphoma in Israeli patients of Iranian origin. *Cancer*, **65**, 590–593
- Siekevitz, M., Feinberg, M.B., Holbrook, N., Wong-Staal, F. & Greene, W.C. (1987) Activation of interleukin 2 and interleukin 2 receptor (Tac) promoter expression by the trans-activator (*tat*) gene product of human T-cell leukemia virus, type I. *Proc. natl Acad. Sci. USA*, **84**, 5389–5393
- Singhal, B.S., Lalkaka, J.A., Sonoda, S., Hashimoto, K., Nomoto, M., Kubota, R. & Osame, M. (1993) Human T-lymphotropic virus type I infections in western India (Letter to the Editor). *AIDS*, **7**, 138–139

- Smadja, D., Cabre, P., Bellance, R. & Vernant, J.-C. (1993) HTLV-I-associated paraplegia in Martinique. A study of 271 cases including 70 with neuromuscular involvement. *Bull. Soc. Pathol. exot.*, **86**, 433–438 (in French)
- Smith, M.R. & Greene, W.C. (1990) Identification of HTLV-I *tax trans*-activator mutants exhibiting novel transcriptional phenotypes. *Genes Dev.*, **4**, 1875–1885
- Smith, M.R. & Greene, W.C. (1991) Type I human T-cell leukemia virus Tax protein transforms rat fibroblasts through the cyclic adenosine monophosphate response element binding protein/-activating transcription factor pathway. *J. clin. Invest.*, **88**, 1038–1042
- Sodroski, J.G., Rosen, C.A. & Haseltine, W.A. (1984) *Trans*-acting transcriptional activation of the long terminal repeat of human T lymphotropic viruses in infected cells. *Science*, **225**, 381–385
- Sonoda, S., Yashiki, S., Fujiyoshi, T., Arima, N., Tanaka, H., Eiraku, N., Izumo, S. & Osame, M. (1992) Immunogenetic factors involved in the pathogenesis of adult T-cell leukemia and HTLV-I-associated myelopathy. *Gann Monogr. Cancer Res.*, **39**, 81–93
- Soriano, V., Calderón, E., Esparza, B., Cilla, G., Aguilera, A., Gutiérrez, M., Tor, J., Pujol, E., Merino, F., Pérez-Trallero, E., Leal, M. & Gonzalez-Lahoz, J. from The HTLV-I/II Spanish Study Group (1993) HTLV-I/II infections in Spain. *Int. J. Epidemiol.*, **22**, 716–719
- Srivastava, B.I.S., Wong-Staal, F. & Getchell, J.P. (1986) Human T-cell leukemia virus I provirus and antibodies in a captive gorilla with non-Hodgkin's lymphoma. *Cancer Res.*, **46**, 4756–4758
- Srivastava, B.I.S., Banki, K. & Perl, A. (1992) Human T-cell leukemia virus type I or a related retrovirus in patients with mycosis fungoides/Sézary syndrome and Kaposi's sarcoma. *Cancer Res.*, **52**, 4391–4395
- Starkebaum, G., Loughran, T.P., Jr, Kalyanaraman, V.S., Kadin, M.E., Kidd, P.G., Singer, J.W. & Ruscetti, F.W. (1987) Serum reactivity to human T-cell leukaemia/lymphoma virus type I proteins in patients with large granular lymphocytic leukaemia. *Lancet*, **i**, 596–598
- de Stasio, G., Lattanzio, A., Rizzi, L., Lancieri, M., Canavaggio, M., Shreiber, L. & Lee, H. (1989) HTLV-I infection is not endemic in Apulia (southern Italy) (Letter to the Editor). *Int. J. Cancer*, **44**, 1132–1133
- St Clair Morgan, O. (1994) The myeloneuropathies of Jamaica. *Mol. Neurobiol.*, **8**, 149–153
- St Clair Morgan, O., Rodgers-Johnson, P., Mora, C. & Char, G. (1989) HTLV-I and polymyositis in Jamaica. *Lancet*, **ii**, 1184–1187
- Strickler, H.D., Ratray, C., Escoffery, C., Manns, A., Schiffman, M.H., Brown, C., Cranston, B., Hanchard, B., Palefsky, J.M. & Blattner, W.A. (1995) Human T-cell lymphotropic virus type I and severe neoplasia of the cervix in Jamaica. *Int. J. Cancer*, **61**, 23–26
- Stuver, S.O., Tachibana, N., Okayama, A., Shioiri, S., Tsunetoshi, Y., Tsuda, K. & Mueller, N.E. (1993) Heterosexual transmission of human T cell leukemia/lymphoma virus type I among married couples in southwestern Japan: an initial report from the Miyazaki Cohort Study. *J. infect. Dis.*, **167**, 57–65
- Sueyoshi, K., Goto, M., Johnson, M., Sato, E. & Shibata, D. (1994) Anatomical distribution of HTLV-I proviral sequence in an autopsy case of HTLV-I associated myelopathy: a polymerase chain reaction study. *Pathol. int.*, **44**, 27–33
- Sugimoto, M., Nakashima, H., Watanabe, S., Uyama, E., Tanaka, F., Ando, M., Araki, S. & Kawasaki, S. (1987) T-lymphocyte alveolitis in HTLV-I associated myelopathy (Letter to the Editor). *Lancet*, **ii**, 1220

- Sugimoto, M., Nakashima, H., Matsumoto, M., Uyama, E., Ando, M. & Araki, S. (1989) Pulmonary involvement in patients with HTLV-I-associated myelopathy: increased soluble IL-2 receptors in bronchoalveolar lavage fluid. *Am. Rev. respir. Dis.*, **139**, 1329–1335
- Sugimoto, M., Mita, S., Tokunaga, M., Yamaguchi, K., Cho, I., Matsumoto, M., Mochizuki, M., Araki, S., Takatsuki, K. & Ando, M. (1993) Pulmonary involvement in human T-cell lymphotropic virus type-I uveitis: T-lymphocytosis and high proviral DNA load in bronchoalveolar lavage fluid. *Eur. respir. J.*, **6**, 938–943
- Sugito, S., Yamato, K., Sameshima, Y., Yokota, J., Yano, S. & Miyoshi, I. (1991) Adult T-cell leukemia: structures and expression of the *p53* gene. *Int. J. Cancer*, **49**, 880–885
- Sugiyama, H., Doi, H., Yamaguchi, K., Tsuji, Y., Miyamoto, T. & Hino, S. (1986) Significance of postnatal mother-to-child transmission of human T-lymphotropic virus type-I on the development of adult T-cell leukemia/lymphoma. *J. med. Virol.*, **20**, 253–260
- Sumida, T., Yonaha, F., Maeda, T., Kita, Y., Iwamoto, I., Koike, T. & Yoshida, S. (1994) Expression of sequences homologous to HTLV-I *tax* gene in the labial salivary glands of Japanese patients with Sjögren's syndrome. *Arthrit. Rheum.*, **37**, 545–550
- Suzuki, T., Fujisawa, J.-I., Toita, M. & Yoshida, M. (1993) The *trans*-activator Tax of human T-cell leukemia virus type I (HTLV-I) interacts with cAMP-responsive element (CRE) binding and CRE modulator proteins that bind to the 21-base-pair enhancer of HTLV-I. *Proc. natl Acad. Sci. USA*, **90**, 610–614
- Suzuki, T., Hirai, H. & Yoshida, M. (1994) Tax protein of HTLV-I interacts with the Rel homology domain of NF- κ B p65 and c-Rel proteins bound to the NF- κ B binding site and activates transcription. *Oncogene*, **9**, 3099–3105
- Suzuki, T., Hirai, H., Murakami, T. & Yoshida, M. (1995) Tax protein of HTLV-I destabilizes the complexes of NF- κ B and I κ B- α and induces nuclear translocation of NF- κ B for transcriptional activation. *Oncogene*, **10**, 1199–1207
- Suzuki, T., Kitao, S., Matsushime, H. & Yoshida, M. (1996) HTLV-I Tax protein interacts with cyclin-dependent kinase inhibitor p16^{INK4A} and counteracts its inhibitory activity towards CDK4. *EMBO J.*, **15**, 1607–1614
- Switzer, W.M., Pieniazek, D., Swanson, P., Samdal, H.H., Soriano, V., Khabbaz, R.F., Kaplan, J.E., Lal, R.B. & Heneine, W. (1995) Phylogenetic relationship and geographic distribution of multiple human T-cell lymphotropic virus type II subtypes. *J. Virol.*, **69**, 621–632
- Tachibana, N., Okayama, A., Ishizaki, J., Yokota, T., Shishime, E., Murai, K., Shioiri, S., Tsuda, K., Essex, M. & Mueller, N. (1988) Suppression of tuberculin skin reaction in healthy HTLV-I carriers from Japan. *Int. J. Cancer*, **42**, 829–831
- Tachibana, N., Okayama, A., Ishihara, S., Shioiri, S., Murai, K., Tsuda, K., Goya, N., Matsuo, Y., Essex, M., Stuver, S. & Mueller, N. (1992) High HTLV-I proviral DNA level associated with abnormal lymphocytes in peripheral blood from asymptomatic carriers. *Int. J. Cancer*, **51**, 593–595
- Tajima, K. (1990) The 4th nation-wide study of adult T-cell leukemia/lymphoma (ATL) in Japan: estimates of risk of ATL and its geographical and clinical features. The T- and B-cell Malignancy Study Group. *Int. J. Cancer*, **45**, 237–243
- Tajima, K. & Cartier, L. (1995) Epidemiological features of HTLV-I and adult T cell leukemia. *Intervirology*, **38**, 238–246

- Tajima, K. & Hinuma, Y. (1984) Epidemiological features of adult T cell leukemia. In: Mathe, G. & Rizenstein, P., eds, *Pathophysiological Aspects of Cancer Epidemiology*, Oxford, Pergamon Press, pp. 75–87
- Tajima, K. & Hinuma, Y. (1992) Epidemiology of HTLV-I/II in Japan and the world. *Gann Monogr. Cancer Res.*, **39**, 129–149
- Tajima, K. & Kuroishi, T. (1985) Estimation of rate of incidence of ATL among ATL (HTLV-I) carriers in Kyushu, Japan. *Jpn. J. clin. Oncol.*, **15**, 423–430
- Tajima, K., Tominaga, S., Suchi, T., Kawagoe, T., Komoda, H., Hinuma, Y., Oda, T. & Fujita, K. (1982) Epidemiological analysis of the distribution of antibody to adult T-cell leukemia-virus-associated antigen: possible horizontal transmission of adult T-cell leukemia virus. *Gann*, **73**, 893–901
- Tajima, K., Tominaga, S., Suchi, T., Fukui, H., Komoda, H. & Hinuma, Y. (1986) HTLV-I carriers among migrants from an ATL-endemic area to ATL non-endemic metropolitan areas in Japan. *Int. J. Cancer*, **37**, 383–387
- Tajima, K., Kamura, S., Ito, S.-I., Ito, M., Nagatomo, M., Kinoshita, K.-I. & Ikeda, S. (1987) Epidemiological features of HTLV-I carriers and incidence of ATL in an ATL-endemic island: a report of the community-based co-operative study in Tsushima, Japan. *Int. J. Cancer*, **40**, 741–746
- Tajima, K., Ito, S.-I., Tsushima & Tsushima ATL Study Group (1990a) Prospective studies of HTLV-I and associated diseases in Japan. In: Blattner, W.A., ed., *Human Retrovirology: HTLV*, New York, Raven Press, pp. 267–279
- Tajima, K., The T- and B-cell Malignancy Study Group & Co-authors (1990b) The 4th nationwide study of adult T-cell leukemia/lymphoma (ATL) in Japan: estimates of risk of ATL and its geographical and clinical features. *Int. J. Cancer*, **45**, 237–243
- Tajima, K., Inoue, M., Takesaki, T., Ito, M. & Ito, S.-I. (1994) Ethnoepidemiology of ATL in Japan with special reference to the Mongoloid dispersal. In: Takatsuki, K., ed., *Adult T-cell Leukemia*, Oxford, Oxford University Press, pp. 91–112
- Takahashi, K., Takezaki, T., Oki, T., Kawakami, K., Yashiki, S., Fujiyoshi, T., Usuku, K., Mueller, N., the Mother-to-child Transmission Study Group, Osame, M., Miyata, K., Nagata, Y. & Sonoda, S. (1991) Inhibitory effect of maternal antibody on mother-to-child transmission of human T-cell lymphotropic virus type I. *Int. J. Cancer*, **49**, 673–677
- Takatsuki, K., Uchiyama, T., Sagawa, K. & Yodoi, J. (1977) Adult T-cell leukemia in Japan. In: Seno, S., Takaku, S. & Irino, S., eds, *Topics in Hematology*, Amsterdam, Excerpta Medica, pp. 73–77
- Takatsuki, K., Yamaguchi, K., Kawano, F., Hattori, T., Nishimura, H., Tsuda, H., Sanada, I., Nakada, K. & Itai, Y. (1985) Clinical diversity in adult T-cell leukemia-lymphoma. *Cancer Res.*, **45** (Suppl.), 4644s–4645s
- Take, H., Umemoto, M., Kusuhara, K. & Kuraya, K. (1993) Transmission routes of HTLV-I: an analysis of 66 families. *Jpn. J. Cancer Res.*, **84**, 1265–1267
- Takehara, N., Iwahara, Y., Uemura, Y., Sawada, T., Ohtsuki, Y., Iwai, H., Hoshino, H. & Miyoshi, I. (1989) Effect of immunisation on HTLV-I infection in rabbits. *Int. J. Cancer*, **44**, 332–336
- Takemoto, S., Matsuoka, M., Yamaguchi, K. & Takatsuki, K. (1994) A novel diagnostic method of adult T-cell leukemia: monoclonal integration of human T-cell lymphotropic virus type I provirus DNA detected by inverse polymerase chain reaction. *Blood*, **84**, 3080–3085

- Takezaki, T., Tajima, K., Komoda, H. & Imai, J. (1995) Incidence of human T lymphotropic virus type I seroconversion after age 40 among Japanese residents in an area where the virus is endemic. *J. infect. Dis.*, **171**, 559–565
- Takezaki, T., Tajima, K., Ito, M., Ito, S.-I., Kinoshita, K.-I., Tachibana, K., Yamashita, Y. & The Tsushima ATL Study Group (1996) Short-term breast-feeding may reduce the risk of vertical transmission of HTLV-I. *Leukemia Res.* (in press)
- Tamura, K., Unoki, T., Sagawa, K., Aratake, Y., Kitamura, T., Tachibana, N., Ohtaki, S., Yamaguchi, K. & Seita, M. (1985) Clinical features of OKT4⁺/OKT8⁺ adult T-cell leukemia. *Leuk. Res.*, **9**, 1353–1359
- Tanaka, A., Takahashi, C., Yamaoka, S., Nosaka, T., Maki, M. & Hatanaka, M. (1990) Oncogenic transformation by the *tax* gene of human T-cell leukemia virus type I *in vitro*. *Proc. natl Acad. Sci. USA*, **87**, 1071–1075
- Tanaka, Y., Fukudome, K., Hayashi, M., Takagi, S. & Yoshie, O. (1995) Induction of ICAM-1 and LFA-3 by Tax I of human T-cell leukemia virus type I and mechanism of down-regulation of ICAM-1 or LFA-1 in adult T-cell leukemia cell lines. *Int. J. Cancer*, **60**, 554–561
- T- and B-Cell Malignancy Study Group (1985) Statistical analyses of clinico-pathological, virological and epidemiological data on lymphoid malignancies with special reference to adult T-cell leukemia/lymphoma: a report of the second nationwide study of Japan. *Jpn. J. clin. Oncol.*, **15**, 517–535
- T- and B-cell Malignancy Study Group (1988) The third nation-wide study on adult T-cell leukemia/lymphoma (ATL) in Japan: characteristic patterns of HLA antigen and HTLV-I infection in ATL patients and their relatives. *Int. J. Cancer*, **41**, 505–512
- T- and B-cell Malignancy Study Group (1996) A report from the 7th nationwide study of adult T-cell leukemia/lymphoma (ATL in Japan). *Jpn. J. Cancer Clin.*, **42**, 231–247 (in Japanese)
- Tanimura, A., Teshima, H., Fujisawa, J.I. & Yoshida, M. (1993) A new regulatory element that augments the Tax-dependent enhancer of human T-cell leukemia virus type I and cloning of cDNAs encoding its binding proteins. *J. Virol.*, **67**, 5375–5382
- Taylor, G.P. (1996) The epidemiology of HTLV-I in Europe. *J. acquir. Immune Defic. Syndr. hum. Retrovirol.*, **13** (Suppl. 1), S8–S14
- Tedder, R.S., Shanson, D.C., Jeffries, D.J., Cheingsong-Popov, R., Clapham, P., Dalgleish, A., Nagy, K. & Weiss, R.A. (1984) Low prevalence in the UK of HTLV-I and HTLV-II infection in subjects with AIDS, with extended lymphadenopathy, and at risk of AIDS. *Lancet*, **ii**, 125–128
- de Thé, G. & Bomford, R. (1993) An HTLV-I vaccine: why, how, for whom? *AIDS Res. hum. Retroviruses*, **9**, 381–386
- de Thé, G. & Gessain, A. (1986) Seroepidemiologic data on viral infections (HTLV-I and LAV/HTLV-III) in the Caribbean region and intertropical Africa. *Ann. Pathol.*, **6**, 261–264 (in French)
- de Thé, G., Gessain, A., Gazzolo, L., Robert-Guroff, M., Najberg, G., Calender, A., Peti, M'P., Brubaker, G., Bensliman, A., Fabry, F., Strobel, M., Robin, Y. & Fortune, R. (1985) Comparative seroepidemiology of HTLV-I and HTLV-III in the French West Indies and some African countries. *Cancer Res.*, **45** (Suppl.), 4633s–4636s
- Tobinai, K., Ohtsu, T., Hayashi, M., Kinoshita, T., Matsuno, Y., Mukai, K. & Shimoyama, M. (1991) Epstein–Barr virus (EBV) genome carrying monoclonal B-cell lymphoma in a patient with adult T-cell leukemia-lymphoma. *Leuk. Res.*, **15**, 837–846

- Tokioka, T., Shimamoto, Y., Funai, N., Nagumo, F., Motoyoshi, K., Tadano, J. & Yamaguchi, M. (1992) Coexistence of acute monoblastic leukemia and adult T-cell leukemia: possible association with HTLV-I infection in both cases? *Leuk. Lymph.*, **8**, 147–155
- Tokudome, S., Tokunaga, O., Shimamoto, Y., Miyamoto, Y., Sumida, I., Kikuchi, M., Takeshita, M., Ikeda, T., Fujiwara, K., Yoshihara, M., Yanagawa, T. & Nishizumi, M. (1989) Incidence of adult T-cell leukemia/lymphoma among human T-lymphotropic virus type I carriers in Saga, Japan. *Cancer Res.*, **49**, 226–228
- Tokudome, S., Maeda, Y., Fukada, K., Teshima, D., Asakura, T., Sueoka, E., Motomura, Y., Kusumoto, Y., Imamura, Y., Kiyokawa, T., Ikeda, M. & Tokunaga, O. (1991) Follow-up of asymptomatic HTLV-I carriers among blood donors in Kyushu, Japan. *Cancer Causes Control*, **2**, 75–78
- Tokudome, S., Shimamoto, Y. & Sumida, I. (1993) Smoking and adult T-cell leukemia/lymphoma. *Eur. J. Cancer Prev.*, **2**, 84–85
- Tosswill, J.H.C., Parry, J.V. & Weber, J.N. (1992) Application of screening and confirmatory assays for anti-HTLV-I/II in U.K. populations. *J. med. Virol.*, **36**, 167–171
- Traina-Dorge, V., Blanchard, J., Martin, L. & Murphey-Corb, M. (1992) Immunodeficiency and lymphoproliferative disease in an African green monkey dually infected with SIV and STLV-I. *AIDS Res. hum. Retroviruses*, **8**, 97–100
- Trujillo, J.M., Concha, M., Muñoz, A., Bergonzoli, G., Mora, C., Borrero, I., Gibbs, C.J., Jr & Arango, C. (1992) Seroprevalence and cofactors of HTLV-I infection in Tumaco, Colombia. *AIDS Res. hum. Retroviruses*, **8**, 651–657
- Tsuda, H. & Takatsuki, K. (1984) Specific decrease in T3 antigen density in adult T-cell leukaemia cells: I. Flow microfluorometric analysis. *Br. J. Cancer*, **50**, 843–845
- Tsuda, H., Sawada, T., Sakata, K.-M. & Takatsuki, K. (1992) Possible mechanisms for the elevation of serum beta-2 microglobulin levels in adult T-cell leukemia. *Int. J. Hematol.*, **55**, 179–187
- Tsuji, Y., Doi, H., Yamabe, T., Ishimaru, T., Miyamoto, T. & Hino, S. (1990) Prevention of mother-to-child transmission of human T-lymphotropic virus type-I. *Pediatrics*, **86**, 11–17
- Tsujimoto, H., Komuro, A., Iijima, K., Miyamoto, J., Ishikawa, K.-I. & Hayami, M. (1985) Isolation of simian retroviruses closely related to human T-cell leukemia virus by establishment of lymphoid cell lines from various non-human primates. *Int. J. Cancer*, **35**, 377–384
- Tsujimoto, H., Noda, Y., Ishikawa, K.-I., Nakamura, H., Fukasawa, M., Sakakibara, I., Sasagawa, A., Honjo, S. & Hayami, M. (1987) Development of adult T-cell leukemia-like disease in African green monkey associated with clonal integration of simian T-cell leukemia virus type I. *Cancer Res.*, **47**, 269–274
- Tuppin, P., Lepère, J.-F., Carles, G., Ureta-Vidal, A., Gérard, Y., Peneau, C., Tortevoeye, P., de Thé, G., Moreau, J.-P. & Gessain, A. (1995) Risk factors for maternal HTLV-I infection in French Guiana: high HTLV-I prevalence in the Noir Marron population. *J. acquir. Immune Defic. Syndr. hum. Retrovirol.*, **8**, 420–425
- Tuppin, P., Makuwa, M., Guerma, T., Bazabana, M.M., Loukaka, J.-C., Jeannel, D., M'Pelé, P. & de Thé, G. (1996) Low HTLV-I/II seroprevalence in pregnant women in Congo and a geographic cluster of an HTLV-like indeterminate western blot pattern (Letter to the Editor). *J. acquir. Immune Defic. Syndr. hum. Retrovirol.*, **11**, 105–107
- Uchiyama, T., Yodoi, J., Sagawa, K., Takatsuki, K. & Uchino, H. (1977) Adult T-cell leukemia: clinical and hematologic features of 16 cases. *Blood*, **50**, 481–492

- Uchiyama, T., Hori, T., Tsudo, M., Wano, Y., Umadome, H., Tamori, S., Yodoi, J., Maeda, M., Sawami, H. & Uchino, H. (1985) Interleukin-2 receptor (Tac antigen) expressed on adult T cell leukemia cells. *J. clin. Invest.*, **76**, 446–453
- Ueda, K., Kusuhara, K., Tokugawa, K., Miyazaki, C., Yoshida, C., Tokumura, K., Sonoda, S. & Takahashi, K. (1989) Cohort effect on HTLV-I seroprevalence in southern Japan (Letter to the Editor). *Lancet*, **ii**, 979
- Uematsu, T., Hanada, S., Saito, T., Otsuka, M., Komidori, K., Osaki, K., Uemura, S., Ueda, H., Harada, R. & Hashimoto, S. (1989) Adult T cell leukemia in hemodialysis patients from the Kagoshima district, an area in which human T cell leukemia virus type I is highly endemic. *Nephron*, **51**, 257–260
- Uemura, Y., Kotani, S., Yoshimoto, S., Fujishita, M., Yano, S., Ohtsuki, Y. & Miyoshi, I. (1986) Oral transmission of human T-cell leukemia virus type I in the rabbit. *Jpn. J. Cancer Res. (Gann)*, **77**, 970–973
- Uittenbogaard, M.N., Giebler, H.A., Reisman, D. & Nyborg, J.K. (1995) Transcriptional repression of *p53* by human T-cell leukemia virus type I Tax protein. *J. biol. Chem.*, **270**, 28503–28506
- Umehara, F., Nakamura, A., Izumo, S., Kubota, R., Ijichi, S., Kashio, N., Hashimoto, K.-I., Usuku, K., Sato, E. & Osame, M. (1994) Apoptosis of T lymphocytes in the spinal cord lesions in HTLV-I associated myelopathy: a possible mechanism to control viral infection in the central nervous system. *J. Neuropathol. exp. Neurol.*, **53**, 617–624
- Uozumi, K., Iwahashi, M., Ueda, H., Otsuka, M., Ishibashi, K., Hanada, S. & Arima, T. (1991) Adult T-cell leukaemia and HTLV-I associated myelopathy in a family (Letter to the Editor). *Lancet*, **338**, 572
- Ureta-Vidal, A., Gessain, A., Yoshida, M., Mahieux, R., Nishioka, K., Tekaiia, F., Rosen, L. & de Thé, G. (1994) Molecular epidemiology of HTLV type I in Japan: evidence for two distinct ancestral lineages with a particular geographical distribution. *AIDS Res. hum. Retroviruses*, **10**, 1557–1566
- Usuku, K., Sonoda, S., Osame, M., Yashiki, S., Takahashi, K., Matsumoto, M., Sawada, T., Tsuji, K., Tara, M. & Igata, A. (1988) HLA haplotype-linked high immune responsiveness against HTLV-I in HTLV-I-associated myelopathy: comparison with adult T-cell leukemia/lymphoma. *Ann. Neurol.*, **23** (Suppl.), S143–S150
- U-Taniguchi, Y., Furuke, K., Masutani, H., Nakamura, H. & Yodoi, J. (1995) Cell cycle inhibition of HTLV-I transformed T cell lines by retinoic acid: the possible therapeutic use of thioredoxin reductase inhibitors. *Oncol. Res.*, **7**, 183–189
- Vallejo, A. & Garcia-Saiz, A. (1994) Isolation and nucleotide sequence analysis of human T-cell lymphotropic virus type II in Spain (Letter to the Editor). *J. acquir. Immune Defic. Syndr.*, **7**, 517–519
- Vandamme, A.-M., Liu, H.-F., Van Brussel, M., De Meurichy, W., Desmyter, J. & Goubau, P. (1996) The presence of a divergent T-lymphotropic virus in a wild-caught pygmy chimpanzee (*Pan paniscus*) supports an African origin for the human T-lymphotropic/simian T-lymphotropic group of viruses. *J. gen. Virol.*, **77**, 1089–1099

- Varma, M., Rudolph, D.L., Knuchel, M., Switzer, W., Hadlock, K.G., Velligan, M., Chan, L., Fong, S.K.H. & Lal, R.B. (1995) Enhanced specificity of truncated transmembrane protein for serological confirmation of human T-cell lymphotropic virus type I (HTLV-I) and HTLV-II infections by western blot (immunoblot) assay containing recombinant envelope glycoproteins. *J. clin. Microbiol.*, **33**, 3239–3244
- Verdier, M., Denis, F., Sangaré, A., Barin, F., Gershy-Damet, G., Rey, J.-L., Soro, B., Léonard, G., Mounier, M. & Hugon, J. (1989) Prevalence of antibody to human T cell leukemia virus type I (HTLV-I) in populations of Ivory Coast, West Africa. *J. infect. Dis.*, **160**, 363–370
- Verdier, M., Denis, F., Leonard, G., Sangare, A., Patillaud, S., Prince-David, M. & Essex, M. (1990) Comparison of immunofluorescence, particle agglutination, and enzyme immunoassays for detection of human T-cell leukemia virus type I antibody in African sera. *J. clin. Microbiol.*, **28**, 1988–1993
- Verdier, M., Bonis, J. & Denis, F. (1994) The prevalence and incidence of HTLVs in Africa. In: Essex, M., Mboup, S., Kanki, P.J., & Kalengayi, M.R., eds, *AIDS in Africa*, New York, Raven Press, pp. 173–193
- Vernau, W., Valli, V.E.O., Dukes, T.W., Jacobs, R.M., Shoukri, M. & Heeney, J.L. (1992) Classification of 1,198 cases of bovine lymphoma using the National Cancer Institute Working Formulation for human non-Hodgkin's lymphomas. *Vet. Pathol.*, **29**, 183–195
- Veyssier-Belot, C., Couderc, L.J., Desgranges, C., Leblond, V., Dairou, F., Caubarrere, I. & de Gennes, J.L. (1990) Kaposi's sarcoma and HTLV-I infection (Letter to the Editor). *Lancet*, **336**, 575
- Voevodin, A.F., Lapin, B.A., Yakovleva, L.A., Ponomaryeva, T.I., Oganyan, T.E. & Razmadze, E.N. (1985) Antibodies reacting with human T-lymphotropic retrovirus (HTLV-I) or related antigens in lymphomatous and healthy hamadryas baboons. *Int. J. Cancer*, **36**, 579–584
- Voevodin, A., Al-Mufti, S., Farah, S., Khan, R. & Miura, T. (1995) Molecular characterization of human T-lymphotropic virus, type I (HTLV-I) found in Kuwait: close similarity with HTLV-I isolates originating from Mashhad, Iran. *AIDS Res. hum. Retroviruses*, **11**, 1255–1259
- Voevodin, A., Samilchuk, E., Schätzl, H., Boerl, E. & Franchini, G. (1996) Interspecies transmission of macaque simian T-cell leukemia/lymphoma virus type I in baboons resulted in an outbreak of malignant lymphoma. *J. Virol.*, **70**, 1633–1639
- de Waal, F.B.M. (1995) Bonobo sex and society. The behavior of a close relative challenges assumptions about male supremacy in human evolution. *Sci. Am.*, **272**, 82–88
- Wagner, S. & Green, M.R. (1993) HTLV-I Tax protein stimulation of DNA binding of bZIP proteins by enhancing dimerization. *Science*, **262**, 395–399
- Waldmann, T.A., Goldman, C.K., Bongiovanni, K.F., Sharrow, S.O., Davey, M.P., Cease, K.B., Greenberg, S.J. & Longo, D.L. (1988) Therapy of patients with human T-cell lymphotropic virus I-induced adult T-cell leukemia with anti-Tac, a monoclonal antibody to the receptor for interleukin-2. *Blood*, **72**, 1805–1816
- Waldmann, T.A., White, J.D., Carrasquillo, J.A., Reynolds, J.C., Paik, C.H., Gansow, O.A., Brechbield, M.W., Jaffe, E.S., Fleisher, T.A., Goldman, C.K., Top, L.E., Bamford, R., Zaknoen, S., Roessler, E., Kasten-Sportes, C., England, R., Litou, H., Johnson, J.A., Jackson-White, T., Manns, A., Hanchard, B., Junghans, R.P. & Nelson, D.L. (1995) Radioimmunotherapy of interleukin-2R α -expressing adult T-cell leukemia with yttrium-90-labeled anti-Tac. *Blood*, **86**, 4063–4075

- Wang, C.-H., Chen, C.-J., Hu, C.-Y., You, S.-L., Chu, C.-T., Chou, M.-J., Essex, M., Blattner, W.A., Liu, C.-H. & Yang, C.-S. (1988) Seroepidemiology of human T-cell lymphotropic virus type I infection in Taiwan. *Cancer Res.*, **48**, 5042–5044
- Washitani, Y., Kuroda, N., Shiraki, H., Nishimura, Y., Yamaguchi, K., Takatsuki, K., Fernando, L.P., Fang, C.T., Kiyokawa, H. & Maeda, Y. (1991) Serological discrimination between HTLV-I and HTLV-II antibodies by ELISA using synthetic peptides as antigens. *Int. J. Cancer*, **49**, 173–177
- Watanabe, T., Seiki, M., Tsujimoto, H., Miyoshi, I., Hayami, M. & Yoshida, M. (1985) Sequence homology of the simian retrovirus genome with human T-cell leukemia virus type I. *Virology*, **144**, 59–65
- Watanabe, T., Yamaguchi, K., Takatsuki, K., Osame, M. & Yoshida, M. (1990) Constitutive expression of parathyroid hormone-related protein gene in human T cell leukemia virus type I (HTLV-I) carriers and adult T cell leukemia patients that can be *trans*-activated by HTLV-I *tax* gene. *J. exp. Med.*, **172**, 759–765
- Wattel, E., Vartanian, J.-P., Pannetier, C. & Wain-Hobson, S. (1995) Clonal expansion of human T-cell leukemia virus type I-infected cells in asymptomatic and symptomatic carriers without malignancy. *J. Virol.*, **69**, 2863–2868
- Wattel, E., Cavrois, M., Gessain, A. & Wain-Hobson, S. (1996) Clonal expansion of infected cells — A way of life for HTLV-I. *J. acquir. Immune Defic. Syndr. hum. Retrovirol.* (in press)
- Weber, J.N., Banatvala, N., Clayden, S., McAdam, K.P.W.J., Palmer, S., Moulds, H., Tosswill, J., Dilger, P., Thorpe, R. & Amann, S. (1989) HTLV-I infection in Papua New Guinea: evidence for serologic false positivity. *J. infect. Dis.*, **159**, 1025–1028
- Weinberg, J.B., Spiegel, R.A., Blazey, D.L., Janssen, R.S., Kaplan, J.E., Robert-Guroff, M., Popovic, M., Matthews, T.J., Haynes, B.F. & Palker, T.J. (1988) Human T-cell lymphotropic virus I and adult T-cell leukemia: report of a cluster in North Carolina. *Am. J. Med.*, **85**, 51–58
- Weinstock, M.A. & Horm, J.W. (1988) Mycosis fungoides in the United States. Increasing incidence and descriptive epidemiology. *J. Am. med. Assoc.*, **260**, 42–46
- Weiss, S.H. (1994) The evolving epidemiology of human T lymphotropic virus type II. *J. infect. Dis.*, **169**, 1080–1083
- Weiss, R.A., Teich, N.M., Varmus, H.E. & Coffin, J. (1985) *RNA Tumor Viruses*, New York, Cold Spring Harbor Laboratory Press
- Welles, S.L., Tachibana, N., Okayama, A., Murai, K., Shioiri, S., Sagawa, K., Katagiri, K. & Mueller, N.E. (1994) The distribution of T-cell subsets among HTLV-I carriers in Japan. *J. acquir. Immune Defic. Syndr.*, **7**, 509–516
- Whittaker, S.J. & Luzzatto, L. (1993) HTLV-I provirus and mycosis fungoides. *Science*, **259**, 1470
- Whittaker, S.J., Ng, Y.L., Rustin, M., Levene, G., McGibbon, D.H. & Smith, N.P. (1993) HTLV-I associated cutaneous disease: a clinicopathological and molecular study of patients from the UK. *Br. J. Dermatol.*, **128**, 483–492
- WHO (1989) Diagnostic Guidelines of HAM/TSP. Virus diseases. Human lymphotropic virus type I, HTLV-I. *Wkly Epidemiol. Rec.*, **49**, 382–383
- WHO (1990) Acquired immunodeficiency syndrome. Proposed WHO criteria for interpreting results from western blot assays for HIV-1, HIV-2 and HTLV-I/HTLV-II. *Wkly Epidemiol. Rec.*, **65**, 281–283

- Wignall, F.S., Hyams, K.C., Phillips, I.A., Escamilla, J., Tejada, A., Li, O., Lopez, F., Chauca, G., Sanchez, S. & Roberts, C.R. (1992) Sexual transmission of human T-lymphotropic virus type-I in Peruvian prostitutes. *J. med. Virol.*, **38**, 44–48
- Wiktor, S.Z., Alexander, S.S., Shaw, G.M., Weiss, S.H., Murphy, E.L., Wilks, R.J., Shortly, V.J., Hanchard, B. & Blattner, W.A. (1990) Distinguishing between HTLV-I and HTLV-II by western blot (Letter to the Editor). *Lancet*, **335**, 1533
- Wiktor, S.Z., Pate, E.J., Weiss, S.H., Gohd, R.S., Correa, P., Fontham, E.T., Hanchard, B., Biggar, R.J. & Blattner, W.A. (1991) Sensitivity of HTLV-I antibody assays for HTLV-II (Letter to the Editor). *Lancet*, **338**, 512–513
- Wiktor, S.Z., Pate, E.J., Murphy, E.L., Palker, T.J., Champegnie, E., Ramlal, A., Cranston, B., Hanchard, B. & Blattner, W.A. (1993) Mother-to-child transmission of human T-cell lymphotropic virus type I (HTLV-I) in Jamaica: association with antibodies to envelope glycoprotein (gp46) epitopes. *J. acquir. immune Defic. Syndr.*, **6**, 1162–1167
- Wiley, C.A., Nerenberg, M., Cros, D. & Soto-Aguilar, M.C. (1989) HTLV-I polymyositis in a patient also infected with the human immunodeficiency virus. *New Engl. J. Med.*, **320**, 992–995
- Wilks, R., Hanchard, B., Morgan, O., Williams, E., Cranston, B., Smith, M.L., Rogers-Johnson, P. & Manns, A. (1996) Patterns of HTLV-I infection among family members of patients with adult T-cell leukemia/lymphoma and HTLV-I associated myelopathy/tropical spastic paraparesis. *Int. J. Cancer*, **65**, 272–273
- Willems, L., Heremans, H., Chen, G., Portetelle, D., Billiau, A., Burny, A. & Kettmann, R. (1990) Cooperation between bovine leukemia virus transactivator protein and Ha-ras oncogene in cellular transformation. *EMBO J.*, **9**, 1577–1581
- Willems, L., Kettmann, R., Chen, G., Portetelle, D., Burny, A. & Derse, D. (1992a) A cyclic AMP-responsive DNA-binding protein (CREB2) is a cellular transactivator of the bovine leukemia virus long terminal repeat. *J. Virol.*, **66**, 766–772
- Willems, L., Portetelle, D., Kerkhofs, P., Chen, G., Burny, A., Mammerickx, M. & Kettmann, R. (1992b) In vivo transfection of bovine leukemia provirus into sheep. *Virology*, **189**, 775–777
- Willems, L., Grimonpont, C., Heremans, H., Rebeyrotte, N., Chen, G., Portetelle, D., Burny, A. & Kettmann, R. (1992c) Mutations in the bovine leukemia virus Tax protein can abrogate the long terminal repeat-directed transactivating activity without concomitant loss of transforming potential. *Proc. natl Acad. Sci. USA*, **89**, 3957–3961
- Willems, L., Kettmann, R., Dequiedt, F., Portetelle, D., Vonèche, V., Cornil, I., Kerkhofs, P., Burny, A. & Mammerickx, M. (1993) In vivo infection of sheep by bovine leukemia virus mutants. *J. Virol.*, **67**, 4078–4085
- Willems, L., Kerkhofs, P., Dequiedt, F., Portetelle, D., Mammerickx, M., Burny, A. & Kettmann, R. (1994) Attenuation of bovine leukemia virus by deletion of R3 and G4 open reading frames. *Proc. natl Acad. Sci. USA*, **91**, 11532–11536
- Willems, L., Gatot, J.S., Mammerickx, M., Portetelle, D., Burny, A., Kerkhofs, P. & Kettmann, R. (1995) The YXXL signalling motifs of the bovine leukemia virus transmembrane protein are required for in vivo infection and maintenance of high viral loads. *J. Virol.*, **69**, 4137–4141
- Williams, C.K.O., Alabi, G.O., Junaid, T.A., Saxinger, C., Gallo, R.C., Blayney, D.W., Blattner, W.A. & Greaves, M.F. (1984) Human T cell leukaemia virus associated lymphoproliferative disease: report of two cases in Nigeria. *Br. med. J.*, **288**, 1495–1496

- Williams, A.E., Fang, C.T., Slamon, D.J., Poiesz, B.J., Sandler, S.G., Darr, W.F., II, Shulman, G., McGowan, E.I., Douglas, D.K., Bowman, R.J., Peetoom, F., Kleinman, S.H., Lenes, B. & Dodd, R.Y. (1988) Seroprevalence and epidemiological correlates of HTLV-I infection in U.S. blood donors. *Science*, **240**, 643–646
- Williams, N.P., Tsuda, H., Yamaguchi, K., Takeya, M., Watanabe, T., Ishii, T., Hamaguchi, I., Tsuruta, J., Ishimaru, Y. & Takatsuki, K. (1991) Blood transfusion induced opportunistic adult T-cell leukemia/lymphoma after Hodgkin's disease. *Leuk. Lymph.*, **5**, 435–439
- Wolin, M., Kornuc, M., Hong, C., Shin, S.-K., Lee, F., Lau, R. & Nimer, S. (1993) Differential effect of HTLV infection and HTLV Tax on interleukin 3 expression. *Oncogene*, **8**, 1905–1911
- Wucherpfennig, K.W., Höllsberg, P., Richardson, J.H., Benjamin, D. & Hafler, D.A. (1992) T-cell activation by autologous human T-cell leukemia virus type I-infected T-cell clones. *Proc. natl Acad. Sci. USA*, **89**, 2110–2114
- Wyld, P.J., Tosswill, J.H.C., Mortimer, P.P. & Weber, J.N. (1990) Sporadic HTLV-I associated adult T-cell leukaemia (ATL) in the UK. *Br. J. Haematol.*, **76**, 149–150
- Yamada, Y. (1983) Phenotypic and functional analysis of leukemic cells from 16 patients with adult T-cell leukemia/lymphoma. *Blood*, **61**, 192–199
- Yamada, T., Yamaoka, S., Goto, T., Nakai, M., Tsujimoto, Y. & Hatanaka, M. (1994) The human T-cell leukemia virus type I Tax protein induces apoptosis which is blocked by the Bcl-2 protein. *J. Virol.*, **68**, 3374–3379
- Yamada, S., Ikeda, H., Tamazaki, H., Shikishima, H., Kikuchi, K., Wakisaka, A., Kasai, N., Shimotohno, K. & Yoshiki, T. (1995) Cytokine-producing mammary carcinomas in transgenic rats carrying the *pX* gene of human T-lymphotropic virus type I. *Cancer Res.*, **55**, 2524–2527
- Yamaguchi, K. (1994) Human T-lymphotropic virus in Japan. *Lancet*, **343**, 213–216
- Yamaguchi, K., Nishimura, H., Kohrogi, H., Jono, M., Miyamoto, Y. & Takatsuki, K. (1983) A proposal for smoldering adult T-cell leukemia: a clinicopathologic study of five cases. *Blood*, **62**, 758–766
- Yamaguchi, K., Seiki, M., Yoshida, M., Nishimura, H., Kawano, F. & Takatsuki, K. (1984) The detection of human T cell leukemia virus proviral DNA and its application for classification and diagnosis of T cell malignancy. *Blood*, **63**, 1235–1240
- Yamaguchi, K., Nishimura, Y., Kiyokama, T. & Takatsuki, K. (1989) Elevated serum levels of soluble interleukin-2 receptors in HTLV-I-associated myelopathy. *J. Lab. clin. Med.*, **114**, 407–410
- Yamamoto, N., Okada, M., Koyanagi, Y., Kannagi, M. & Hinuma, Y. (1982) Transformation of human leukocytes by cocultivation with an adult T cell leukemia virus producer cell line. *Science*, **217**, 737–739
- Yamamoto, N., Hayami, M., Komuro, A., Schneider, J., Hunsmann, G., Okada, M. & Hinuma, Y. (1984) Experimental infection of cynomolgus monkeys with a human retrovirus, adult T-cell leukemia virus. *Med. Microbiol. Immunol.*, **172**, 57–64
- Yamamoto, H., Sekiguchi, T., Itagaki, K., Saijo, S. & Iwakura, Y. (1993) Inflammatory polyarthritis in mice transgenic for human T cell leukemia virus type I. *Arthrit. Rheum.*, **36**, 1612–1620
- Yamanouchi, K., Kinoshita, K., Moriuchi, R., Katamine, S., Amagasaki, T., Ikeda, S., Ichimaru, M., Miyamoto, T. & Hino, S. (1985) Oral transmission of human T-cell leukemia virus type-I into a common marmoset (*Callithrix jacchus*) as an experimental model for milk-borne transmission. *Jpn. J. Cancer Res. (Gann)*, **76**, 481–487

- Yamaoka, S., Tobe, T. & Hatanaka, M. (1992) Tax protein of human T-cell leukemia virus type I is required for maintenance of the transformed phenotype. *Oncogene*, **7**, 433–437
- Yamashita, I., Katamine, S., Moriuchi, R., Nakamura, Y., Miyamoto, T., Eguchi, K. & Nagataki, S. (1994) Transactivation of the human interleukin-6 gene by human T-lymphotropic virus type I Tax protein. *Blood*, **84**, 1573–1578
- Yamato, K., Oka, T., Hiroi, M., Iwahara, Y., Sugito, S., Tsuchida, N. & Miyoshi, I. (1993) Aberrant expression of the p53 tumor suppressor gene in adult T-cell leukemia and HTLV-I-infected cells. *Jpn. J. Cancer Res.*, **84**, 4–8
- Yanagihara, R. (1994) Geographic-specific genotypes or topotypes of human T-cell lymphotropic virus type I as markers for early and recent migrations of human populations. *Adv. Virus Res.*, **43**, 147–186
- Yanagihara, R., Jenkins, C.L., Alexander, S.S., Mora, C.A. & Garruto, R.M. (1990) Human T-lymphotropic virus type-I infection in Papua New Guinea: high prevalence among the Hagahai confirmed by western analysis. *J. infect. Dis.*, **162**, 649–654
- Yanagihara, R., Ajdukiewicz, A.B., Garruto, R.M., Sharlow, E.R., Wu, X.-Y., Alemaena, O., Sale, H., Alexander, S.S. & Gajudusek, D.C. (1991) Human T-lymphotropic virus type I infection in the Solomon Islands. *Am. J. trop. Med. Hyg.*, **44**, 122–130
- Yodoi, J. & Uchiyama, T. (1986) IL-2 receptor dysfunction and adult T-cell leukemia. *Immunol. Rev.*, **92**, 135–156
- Yoshida, M. (1994) Tenth anniversary perspectives on AIDS. Host-HTLV type I interaction at the molecular level. *AIDS Res. hum. Retroviruses*, **10**, 1193–1197
- Yoshida, M. & Seiki, M. (1987) Recent advances in the molecular biology of HTLV-I: trans-activation of viral and cellular genes. *Ann. Rev. Immunol.*, **5**, 541–559
- Yoshida, M., Seiki, N., Yamaguchi, K. & Takatsuki, K. (1984) Monoclonal integration of human T-cell leukemia provirus in all primary tumors of adult T-cell leukemia suggests causative role of human T-cell virus in the disease. *Proc. natl Acad. Sci. USA*, **81**, 2534–2537
- Yoshida, M., Osame, M., Kawai, H., Toita, M., Kuwasaki, N., Nishida, Y., Hiraki, Y., Takahashi, K., Nomura, K., Sonoda, S., Eiraku, N., Ijichi, S. & Usuku, K. (1989) Increased replication of HTLV-I in HTLV-I-associated myelopathy. *Ann. Neurol.*, **26**, 331–335
- Yoshiki, T., Kondo, N., Chubachi, T., Tateno, M., Togashi, T. & Itoh, T. (1987) Rat lymphoid cell lines with HTLV-I production. III. Transmission of HTLV-I into rats and analysis of cell surface antigens associated with HTLV-I. *Arch. Virol.*, **97**, 181–196
- Yoshimura, T., Fujisawa, J.-I. & Yoshida, M. (1989) Multiple cDNA clones encoding nuclear proteins that bind to the *tax*-dependent enhancer of HTLV-I: all contain a leucine zipper structure and basic amino acid domain. *EMBO J.*, **9**, 2537–2542
- Zamora, T., Zaninovic, V., Kajiwarra, M., Komoda, H., Hayami, M. & Tajima, K. (1990) Antibody to HTLV-I in indigenous inhabitants of the Andes and Amazon regions in Colombia. *Jpn. J. Cancer Res.*, **81**, 715–719
- Zehender, G., Giroto, M., de Maddalena, C., Francisco, G., Moroni, M. & Galli, M. (1996) HTLV infection in ELISA-negative blood donors. *AIDS Res. hum. Retroviruses*, **12**, 737–740
- Zella, D., Mori, L., Sala, M., Ferrante, P., Casoli, C., Magnani, G., Achilli, G., Cattaneo, E., Lori, F. & Bertazzoni, U. (1990) HTLV-II infection in Italian drug abusers (Letter to the Editor). *Lancet*, **336**, 575–576

- Zhao, L.-J. & Giam, C.-Z. (1992) Human T-cell lymphotropic virus type I (HTLV-I) transcriptional activator, Tax, enhances CREB binding to HTLV-I 21-base-pair-repeats by protein-protein interaction. *Proc. natl Acad. Sci. USA*, **89**, 7070–7074
- Zhao, T.M., Robinson, M.A., Bowers, F.S. & Kindt, T.J. (1995) Characterization of an infectious molecular clone of human T-cell leukemia virus type I. *J. Virol.*, **69**, 2024–2030
- Zucker-Franklin, D. & Pancake, B.A. (1994) The role of human T-cell lymphotropic viruses (HTLV-I and II) in cutaneous T-cell lymphomas. *Sem. Dermatol.*, **13**, 160–165
- Zucker-Franklin, D., Coutavas, E.E., Rush, M.G. & Zouzas, D.C. (1991) Detection of human T-lymphotropic virus-like particles in cultures of peripheral blood lymphocytes from patients with mycosis fungoides. *Proc. natl Acad. Sci. USA*, **88**, 7630–7634
- Zucker-Franklin, D., Hooper, W.C. & Evatt, B.L. (1992) Human lymphotropic retroviruses associated with mycosis fungoides: evidence that human T-cell lymphotropic virus type II (HTLV-II) as well as HTLV-I may play a role in the disease. *Blood*, **80**, 1537–1545