THE ACQUIRED IMMUNE DEFICIENCY SYNDROME

Prepared by Communicable Disease Surveillance Centre

In the summer of 1981, an outbreak of 5 cases of Pneumocystis carinii pneumonia (PCP) in previously healthy homosexual men was reported in Los Angeles in the United States of America[1], and at about the same time 26 cases of Kaposi's sarcoma (KS), 4 with confirmed PCP, were reported from New York and California[2], also in previously healthy homosexual men. Between June 1 and November 10, the Centers for Disease Control (CDC), Atlanta, detected 159 cases of KS, PCP and other serious opportunistic infections by active surveillance and by monitoring requests for pentamidine, the drug used to treat PCP and distributed solely by CDC. Three quarters of the cases were from New York city, San Francisco or Los Angeles and 92 per cent of them were homosexual or bisexual males[3]. A 'new' disease had appeared and for epidemiological purposes a case of acquired immune deficiency syndrome (AIDS) was defined by CDC as a person

1. with a reliably diagnosed disease that is at least moderately indicative of an underlying cellular immune deficiency; for example, Kaposi's sarcoma in a patient aged less than 60 years, or opportunistic infection;
2. who has no known underlying cause of cellular immune deficiency nor any other cause of reduced resistance reported to be associated with the disease.

This definition was subsequently accepted by most countries of the world and by the World Health Organisation (WHO) Collaborating Centre for AIDS.

By September 1983, 2,259 cases had been reported with 917 deaths and the disease had spread to most States of the USA, although nearly all the cases were in large cities. The cases were classified into groups at greatest risk of acquiring the disease; 71 per cent were homosexual or bisexual men, 17 per cent (half of them women) were intravenous drug abusers, 1 per cent were haemophiliacs, 1 per cent had had blood transfusions, 1 per cent were sexual partners of persons with AIDS or at increased risk of AIDS, and 6 per cent were in none of these risks groups[4]. Almost half the patients were aged 30-39 years but the drug abuse patients tended to be younger and the transfusion associated patients older. At the end of 1984 these proportions remained similar, but the numbers had increased to 7,691 cases with 3,661 deaths. Cases had been reported in the children of AIDS patients and of persons at increased risk of AIDS, and the number of cases which did not fall into any of the 'risk' groups had increased to over 250.

Soon after the epidemic of AIDS was detected, increasing numbers of patients in the same risk groups were seen with malaise, weight loss, sweats and persistent lymphadenopathy, some of whom subsequently developed AIDS. The syndrome was termed 'pre-AIDS' or 'extended lymphadenopathy syndrome (ELS), but is now usually known as 'persistent generalised lymphadenopathy (PGL). It remains uncertain whether this represents a prodromal phase of AIDS or is a different syndrome caused by the same agent.

AIDS in the United Kingdom

The first case of AIDS in the UK was reported in December 1981[5] and in 1982 a surveillance scheme was set up, using the CDC epidemiological case definition, based on reports by genito-urinary physicians and other clinicians, laboratory reports of opportunistic infections and death certification of AIDS and Kaposi's sarcoma[6]. By the end of 1984, 108 cases and 46 deaths had been reported. The overall fatality rate was similar to that in the USA, totalling between 40 and 50 per cent between 1979-84 but over 70 per cent in cases reported in 1982 or earlier. In the UK, 93 (86 per cent) of cases were in homosexuals, 3 (3 per cent) in haemophiliacs, 1 (1 per cent) in a heterosexual contact and 11 (10 per cent) not in any of the risk groups; of these 11, 6 were either African nationals or associated with Africa. The geographical distribution of the cases resembled the urban clustering in the USA, and reflected the distribution of the homosexual cases, most of which were reported from London; altogether 81 (75 per cent) of cases were in London, 21 (19 per cent) in other parts of Southern England and South Wales, 3 (3 per cent) in Northern England and 3 (3 per cent) in Scotland.

Three main differences were observed between the USA and UK data. First, Kaposi's sarcoma was proportionately more common in the UK (39 per cent of cases), than in the USA (28 per cent of cases). Second, there was only one intravenous drug abuser, who was also homosexual, in the UK, compared with 17 per cent in the USA. Third, the proportion of cases which did not belong to any defined risk group, but which were in persons associated with Africa or the Caribbean, was higher in the UK (6 per cent, all associated with Africa), compared with the USA (3 per cent, all Haitians). This difference was even more striking in the European data because many of the reported cases in France and Belgium were in Africans.

Human T-cell lymphotropic virus type 3

The epidemiology of AIDS resembled that of hepatitis B virus infections and strongly suggested an infectious cause. The search for the possible causative agent resulted in the isolation of lymphotropic retroviruses from patients with AIDS and at risk for AIDS in France and the USA in 1983. The French isolates were named 'lymphadenopathy associated virus' (LAV) and those in the USA human T-cell leukaemia (later changed to lymphotropic) virus type 3 (HTLV3)[7]. Both viruses are now considered to be very similar and to be the primary causative agent(s) of AIDS, although the classification as HTLV3 has not been universally accepted.

HTLV3 has been isolated from blood, semen and saliva of patients with AIDS and appears to

persist in blood for long periods in the presence of antibody; seronegative virus-positive healthy persons have been described in the early stage of the infection, although this is only likely to be of short duration[8]. Thus, there is a wide spectrum of clinical states associated with HTLV3 infection ranging from healthy antibody-negative persons to patients with fully developed AIDS. It seems probable that only a very few of the infected persons become ill, and that this proportion is likely to vary with other factors such as immunological stress from recurrent infections, use of recreational drugs, exposure to allogeneic semen and genetic make-up, for example HLA type[9]. The incubation period of AIDS has been determined in studies conducted on recipients of infected whole blood in the USA; symptoms developed between 15 and 57 months after transfusion (median 27.5 months)[10].

Tests for antibodies to HTLV3 have been developed but these are not tests for AIDS and are difficult to interpret. It is, however, reasonable to assume that blood and blood products from HTLV3 antibody-positive persons are infectious, although these persons may not necessarily be infectious by the sexual route[11]. Furthermore antibody-negative persons in the high risk groups may be infectious[8]. In a study in the UK between 1983 and 1984, 30(97 per cent) of 31 AIDS patients were seropositive, as were 110 (89 per cent) of 124 PGL patients, 53 (17 per cent) of 308 homosexuals without symptoms attending genito-urinary medicine clinics, 53 (34 per cent) of 184 haemophiliacs receiving pooled clotting factors, 4 (1.5 per cent) of 269 intravenous drug abusers and none of 1042 unselected blood donors[11]. These serological data mainly reflect the distribution of AIDS in the UK, but the small number of positive tests from intravenous drug abusers gives rise to particular concern because of the rise in drug abuse and in acute hepatitis B infection in drug abusers since 1983. Spread of HTLV3 and AIDS in this group might be expected to take place.

The spread of AIDS and HTLV3

The spread of HTLV3 appears to be primarily by semen and by blood, usually during homosexual intercourse or by the therapeutic use of blood or blood products.

Sexual transmission: surveillance of AIDS in the USA and UK has shown that most reported cases have been in homosexual or bisexual men, about 71 per cent in the USA and about 86 per cent in the UK, and that these proportions have changed little as the epidemic has progressed. One of the most striking epidemiological features of the disease is its failure to spread widely in the community; only limited spread to female sexual contacts of cases and of persons in high risk groups has been reported and in the USA the proportion of women affected has remained constant at about 6 per cent of the total. This is quite unlike the picture of a heterosexually spread sexually transmitted disease and is perhaps because female to male spread is exceptional. Sero-epidemiological studies of homosexual males accord with this observation. The main risk factors for HTLV3 infection in these men were receptive anal intercourse and multiple sexual partners. By contrast, insertive anal intercourse was not a risk factor[9]. It is probable that transmission of infection is by blood or semen during sexual contact and occurs more readily in homosexual than heterosexual contact because of trauma to the rectal mucosa.

Transmission by blood and blood products: transmission of AIDS by blood or blood products to haemophiliacs and other patients has been reported in 155 cases (2 per cent of the total) in the USA but only to 3 haemophiliacs in the UK, all of whom received USA factor VIII; this represents an incidence of about 1 per 1000 haemophiliacs in the UK. There is no evidence of transmission by hepatitis B vaccine or other blood products, indeed, epidemiological studies have failed to show any association between hepatitis B vaccine and AIDS, and laboratory studies have shown that the method of production of vaccine inactivates human retroviruses[12].

Accidental transmission: transmission of AIDS to health care staff by accidental innoculation of blood or other infected material has not been substantiated. No cases have been reported in the USA[13]. A Danish female surgeon who died of possible AIDS in 1977, after working in hospitals in Northern Zaire since 1972[14], and AIDS in a hospital employee who worked as a housekeeper in a hospital in the USA and who pricked his finger when disposing of waste[15], were reported but in neither case was there any known association with infected material.

Transmission of HTLV3 to a nurse was, however, reported in the UK following a severe needle-stick injury which probably involved the injection of a small amount of blood from a patient with AIDS[15]. Nevertheless, the risk of transmission to health care staff appears to be low. In a study of 85 staff caring for AIDS patients in a USA hospital, 33 of whom had sustained needle-stick injuries, none sero-converted to HTLV3 over a three year period[17]; in another report, from the UK, 21 staff of a haemophilia reference centre caring for HTLV3 antibody-positive patients were seronegative[18].

Transmission from parents to children: AIDS has been reported in 64 children, mostly infants, in the USA whose parents had AIDS or were in groups at increased risk for AIDS; many of the mothers were intravenous drug abusers or sexual contacts of bisexual men. The spread may be transplacental, from cervical secretions or by blood during birth or the early neonatal period[19]. In one case in the USA, the son of a haemophiliac, it appeared that the father had acquired HTLV3 infection from pooled factor VIII. He had transmitted the infection to his wife and the son had subsequently become infected; it was suggested that this took place transplacentally, by breast milk or by maternal or paternal close contact during the early neonatal period[20].

Other routes of transmission: transmission of HTLV3 by other means has not been described. Kissing was suggested in one report[9], but spread by blood in the household was not excluded in this case, and the suggestion remains unsubstantiated. There is no evidence of transmission by casual personal contact, by fomites or by food and such spread seems very unlikely because it would probably require

the application of grossly contaminated material to an open wound, mucous membrane or conjunctiva of a susceptible person. Epidemiological evidence suggests that the possibility of airborne transmission from person to person is remote, although aerosol transmission could theoretically take place in laboratories during the manipulation of high concentrations of virus.

The origin of AIDS and HTLV3 infection

Ninety-three (86 per cent) of reported cases in the UK were in homosexual or bisexual males. Of these 93 cases, 68 (73 per cent) had had sexual contact with USA nationals or Caribbean nationals or had travelled to these places, suggesting that the infection may have been imported into the UK from America. The 3 reported cases in haemophiliacs had all been treated with factor VIII concentrate made from USA donor material; furthermore a comparative study of Scottish and Danish haemophiliacs showed an association between the use of USA factor VIII concentrate and seropositivity to HTLV3[21].

These links with the USA were not present in the cases associated with Africa in the UK and in Africans in continental Europe, who did not fall into any of the risk groups, although these appear to be due to infection with the same agent[22]. The direct association with Africa of these cases supports the hypothesis that the infection originated in sub-Saharan African and spread to Europe in two ways; first via the homosexual population in the USA and blood and blood products derived from that population (the infection may have spread first to Haiti and then to the USA), and second, directly by Africans coming to Europe particularly from Central Africa[23]. Widespread outbreaks of AIDS have, indeed, been reported in Central Africa, but they have features which differ from the North American and European experience, notably the almost equal male to female ratio of cases and the apparent heterosexual transmission[24], which have not been satisfactorily explained.

Prevention of AIDS and HTLV3 infection

Five principle means of prevention are surveillance, counselling, prevention of contamination of blood and blood products, protection of health care staff and general health education.

Surveillance: national surveillance of AIDS in the UK is mainly dependent upon confidential reporting of cases by clinicians to CDSC and CD(S)U[6]; although cases usually present to genito-urinary physicians or to physicians in haemophilia centres, they may present to doctors in other specialties. Therefore, in order to maintain as complete national surveillance of the disease as possible it would be helpful if microbiologists and community physicians could remind their clinical colleagues of this need to report cases or suspected cases of AIDS in their care. In collaboration with the Association of Medical Microbiologists, national surveillance has recently been extended, to include a confidential follow-up of health care staff possibly exposed to HTLV3 infection (CDR 84/52); report forms and details of this scheme are available on request from CDSC.

It is proposed to begin the national collection of data on HTLV3 infections in March 1985 by the laboratory reporting of positive HTLV3-positive antibody tests, which like the clinical reporting of AIDS will be unnamed and in strictest confidence. This reporting system will, it is hoped, provide information about trends in incidence of HTLV3 infection in time, geographically and in persons both within the groups at special risk and outside these groups. Details will be sent to microbiologists in the next few weeks.

Counselling: recommendations for counselling cases and of persons infected with HTLV3 have recently been published in the USA[25], and similar recommendations are likely to be published soon in the UK. They should be asked not to donate blood, body organs, other tissue or sperm. Because of the risk of infecting others by sexual intercourse, infected persons should be advised against multiple sexual partners and insertive anal intercourse. Condoms may limit transmission of infection but are more likely to be effective in heterosexual than in homosexual intercourse. Although spread by saliva is unlikely, infected persons should be advised against intimate kissing and oral-genital contact. As in the control of hepatitis B infection, toothbrushes, razors and any other articles which could become contaminated with blood should not be shared; skin piercing instruments such as hypodermic needles, ear piercing equipment, tattoo and acupuncture needles should be disposable or autoclaved after use. In the event of an accident causing bleeding, the contaminated surfaces should be cleaned with household bleach, freshly diluted 1 in 10 with water.

Blood and blood products: persons with AIDS and in groups at high risk of AIDS, and their sexual contacts, have been asked not to donate blood, and blood transfusion centres now make this specific request to each donor. Some persons in the high risk groups may be HbsAg-positive and, will therefore be excluded from donation, but other infected individuals will not be excluded until a HTLV3 antibody test becomes generally available. Even this will not prevent an infectious antibody-negative person donating blood and the elimination of this risk must await the advent of an HTLV3 antigen test. Pooled factor VIII and factor IX may transmit HTLV3 but this risk should be eliminated by heat treatment[26], which has already began in the USA and is to be introduced in the UK in April 1985. The methods of preparation of hepatitis B vaccine[11] and other blood products, such as immunoglobulins, should inactivate HTLV3 and provide sufficient safeguard against transmission of infection.

Protection of health care staff: methods for protecting health care and other staff possibly exposed to infection with HTLV3 are essentially similar to the methods practised in the prevention of hepatitis B infection[27]. Interim guidelines have now been issued to health authorities for staff coming into contact with patients with AIDS or their specimens[28] and these will be revised within

12 months. Copies of these guidelines are available from DHSS MED-SEB Room 1004, Hannibal House, Elephant and Castle, London SE1 6TE.

Health education: misinformed press and media publicity has generated misconceptions about AIDS and its mode of spread and fostered the erroneous belief that it is highly infectious. The causative agent, HTLV3, spreads mainly by homosexual intercourse and by blood and blood products, in a similar way to hepatitis B; there is no evidence that it spreads by casual social contact, by food, by fomites, or by the airborne route. These facts have been publicised in statements from DHSS and in pamphlets available from the Health Education Council (STD 21), 13-19 Standard Road, London NW10 6HD, the Terrence Higgins Trust Limited, BM Aids, London WC1N 3XX and from the Haemophilia Society, PO Box 9, 16 Trinity Street, London SE1 1DE.

References

1. Centers for Disease Control. Pneumocystis pneumonia - Los Angeles. Morbidity and Mortality Weekly Report 1981; 30: 250-52.
2. Centers for Disease Control. Kaposi's sarcoma and pneumocystis pneumonia among homosexual men - New York City and California. Morbidity and Mortality Weekly Report 1981; 30: 305-08.
3. Anon. Epidemiologic aspects of the current outbreak of Kaposi's sarcoma and opportunistic infections. N Engl J Med 1982; 306: 248-52.
4. Centers for Disease Control. Update: Acquired immunodeficiency syndrome (AIDS) - United States. Morbidity and Mortality Weekly Report 1983; 32: 465-67.
5. Dubois RM, Branthwaite MA, Mikhail JR, Batten JC. Primary Pneumocystis carinii and cytomegalovirus infections. Lancet 1981; 2: 1339.
6. Communicable Disease Surveillance Centre. Surveillance of the acquired immune deficiency syndrome in the United Kingdom, January 1982-July 1983. Br Med J 1983; 287: 407-08.
7. Anon. The cause of AIDS? Lancet 1984; 1: 1053-54.
8. Salahuddin SZ, Groopman JE, Markham PD et al. HTLV-III in symptom-free seronegative persons. Lancet 1984; 2: 1418-20.
9. Goedert JJ, Sarngadharan MG, Biggar RJ et al. Determinants of retrovirus (HTLV-III) antibody and immunodeficiency conditions in homosexual men. Lancet 1984; 2: 711-16.
10. Curran JW, Laurence DN, Jaffe H et al. Acquired immunodeficiency syndrome (AIDS) associated with transfusions. N Engl J Med 1984; 310: 69-75.
11. Cheinsong-Popov R, Weiss RA, Dalgleish A et al. Prevalence of antibody to human T-lymphotropic virus type III in AIDS and AIDS-risk patients in Britain. Lancet 1984; 2: 477-80.
12. Centers for Disease Control. Hepatitis B vaccine: Evidence confirming lack of AIDS transmission. Morbidity and Mortality Weekly Report 1984; 33: 685-87.
13. Adler MW, Weller IVD. AIDS : sense not fear. Br Med J 1984; 288: 1177-78.
14. Bygbjerg IC. AIDS in a Danish surgeon (Zaire, 1976). Lancet 1983; 1: 925.
15. Belani A, Dunning R, Dutta D et al. AIDS in a hospital worker. Lancet 1984; 1: 676.
16. Anon. Needlestick transmission of HTLV-III from a patient infected in Africa. Lancet 1984; 2: 1376-77.
17. Hirsch MS, Wormser GP, Schooley RT et al. Risk of nosocomial infection with human T-cell lymphotropic virus III (HTLV-III). N Engl J Med 1985; 312: 1-4.
18. Jones P, Hamilton P. HTLV-III antibodies in haematology staff. Lancet 1985; 1: 217.
19. Cowan MJ, Hellmann D, Chudwin D, Wara DW, Chang RS, Ammann AJ. Maternal transmission of acquired immune deficiency syndrome. Paediatrics 1984; 73, 382-86.
20. Ragni MV, Urbach AH, Kiernan S et al. Acquired immunodeficiency syndrome in the child of a haemophiliac. Lancet 1985; 1: 133-35.
21. Melbye M, Froebel KS, Madhok R et al. HTLV-III seropositivity in European haemophiliacs exposed to factor VIII concentrate imported from the USA. Lancet 1984; 2: 1444-46.
22. Ellrodt A, Barré-Sinoussi F, Lebras Ph et al. Isolation of human T-lymphotropic retrovirus (LAV) from Zairian married couple, one with AIDS, one with prodromes. Lancet 1984; 1: 1383-85.
23. De Cock KM. AIDS: an old disease from Africa? Br Med J 1984; 289: 306-08.
24. Piot P, Quinn TC, Taelman H et al. Acquired immunodeficiency syndrome in a heterosexual population in Zaire. Lancet 1984; 2: 65-69.
25. Centers for Disease Control. Provisional Public Health Service Inter-agency recommendations for screening donated blood and plasma for antibody to the virus causing acquired immunodeficiency syndrome. Morbidity and Mortality Weekly Report 1985; 34: 1-5.
26. Spire B, Dormont D, Barré-Sinoussi F, Montagnier L, Chermann JC. Inactivation of lymphadenopathy-associated virus by heat, gamma rays, and ultraviolet light. Lancet 1985; 1: 188-89.
27. Department of Health and Social Security. Guidance for health care personnel dealing with patients infected with hepatitis B virus. CMO (84)11. DHSS 1984, London.
28. Advisory Committee on Dangerous Pathogens. Acquired Immune deficiency syndrome (AIDS) - Interim guidelines. DHSS 1984; London.