The Epidemiology of AIDS: Current Status and Future Prospects

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Summary. The reported incidence of acquired immune deficiency syndrome (AIDS) continues to increase in countries throughout the world. On the basis of a polynomial model for extrapolation, the cumulative number of cases diagnosed and reported since 1981 in the United States is expected to double during the next year with over 12,000 additional cases projected to be diagnosed by July 1986. The annual incidence rates for single (never-married) men in Manhattan and San Francisco, intravenous drug users in New York City and New Jersey, and persons with hemophilia A ranged from 261 to 350 per 100,000 population during 1984. For single men aged 25 to 44 years in Manhattan and San Francisco, AIDS was the leading cause of premature mortality in 1984 as measured by years of potential life lost. Infection with HTLV-III/LAV is considerably more common than reported AIDS in high-risk populations and can persist at least for several years, so the presence of specific antibody should be considered presumptive evidence of current infection. The screening of donated blood and plasma for antibody to HTLV-III/LAV and use of safer clotting factor concentrates should greatly reduce HTLV-III/LAV transmission through blood and blood products. Most HTLV-III/LAV infections occur through sexual transmission, use of contaminated needles, and as a result of infected mothers passing the virus to newborns. Continued research commitment is needed to develop an HTLV-III/LAV vaccine and therapy for this infection. In the interim, widespread community efforts are needed to minimize transmission.

The first cases of acquired immune deficiency syndrome (AIDS) were reported in mid-1981 (*1*). The initial occurrence of the syndrome among homosexual men and users of intravenous drugs suggested a transmissible agent as the cause. The transmissible agent hypothesis became more widely accepted by early 1983, with the well-documented occurrence of the syndrome in persons with hemophilia and recipients of blood transfusions (*2*). During the next year, a retrovirus variously termed lymphadenopathy-associated virus (LAV), human T-lymphotropic virus type III (HTLV-III), or AIDS-associated retrovirus (ARV) was isolated and shown to be the cause of AIDS (*3*).

Magnitude of the Problem

Cases in the United States. By 30 August 1985, 12,932 cases of AIDS had been reported to the Centers for Disease Control (CDC); more than half had been reported during the preceding 12 months. Over 6,480 (50 percent) persons were known to have died; the case fatality rate was over 75 percent for patients diagnosed before January 1983. Of the 12,767 adult cases, more than 73 percent were in homosexual or bisexual men (12 percent who also used intravenous drugs); 17 percent occurred in heterosexual men or women who used intravenous drugs. An additional 195 (1.5 percent) patients with no other risk factors had received a transfusion of whole blood or one of its components within 5 years of diagnosis, and 86 (0.7 percent) were persons with hemophilia who had received clotting factor concentrates. There were 129 (1.0 percent) heterosexual partners of AIDS patients or persons at increased risk for AIDS. The remaining 814 (6.4 percent) could not be classified by recognized risk factors for AIDS; this group included 341 persons born outside the United States, in countries where most AIDS cases have not been associated with known risk factors. Most of these cases in the United States were among Haitians. Of the 165 cases diagnosed among infants and children, 116 (70 percent) were born to a parent who had AIDS or belonged to an identified risk group for AIDS, 25 (15 percent) had received transfusions, 9 (5 percent) had hemophilia, and the remaining 15 had no identified risk factor or incomplete epidemiologic investigations.

Cases have been reported from 46 states, the District of Columbia, and three U.S. territories. Most cases have been reported from New York, California, New Jersey, and Florida, but proportionately greater increases have been noted recently from other states. The geographic distribution of AIDS cases in children with parents in high-risk groups is similar to that seen in heterosexual adult patients with AIDS.

The ad hoc model described in Fig. 1 predicts that over 12,000 additional cases will be diagnosed between July 1985 and June 1986 inclusive (*4*). Over half of these cases are predicted to be from states other than New York and California.

Cases outside the United States. By March 1985, 940 cases of AIDS had been reported from Europe to the World Health Organization Collaborating Center on AIDS (*5*). The largest number of cases were reported from France (307) and the Federal Republic of Germany (162). Seventy-two percent of cases reported were in homosexual men, but only 1.5 percent were in heterosexual men and women who used intravenous drugs. As of December 1984, 111 (15 percent) of the European patients were born in one of 18 African countries. Twenty-four (3 percent) of the European patients were born in Caribbean countries, with the majority from Haiti.

In the Americas, 778 cases had been reported from 14 countries other than the United States, the largest numbers being from Haiti (340), Canada (190), and Brazil (182) (*6*). Outside Europe and the Americas, the only country with a large number of reported cases is Australia (95).

Cases have been reported in residents of nearly 20 countries in Africa, but studies of AIDS have been conducted primarily in Zaire and Rwanda (*7*). In Zaire, the male to female ratio was approximately 1.1 to 1, and the annual incidence was estimated to be between 17 and 40 per hundred thousand population.

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Incidence rates and mortality. Estimates of population-specific annual incidence rates of AIDS place the magnitude of the AIDS problem in the United States in perspective (Fig. 2) (*8*). Single men in Manhattan and San Francisco, intravenous drug users in New York City and New Jersey, and hemophilia A patients had high rates of disease (>250 per 100,000). For these groups, 1984 incidence rates of AIDS were similar to U.S. population incidence rates of all cancers (1973–1977 average annual incidence rate of 331.5 per 100,000) and mortality rate of heart disease (1982 mortality rate of 191 per 100,000) (*9*).

Recent Haitian entrants had estimated incidence rates much higher than Haitians who had entered the United States prior to 1978. This finding is consistent with the observation that AIDS is also a fairly new disease in Haiti.

Female partners of men who use intravenous drugs and recipients of blood transfusions had much lower estimated rates of AIDS. The estimated rate for transfusion-associated AIDS in children was nearly five times that in adults. Most pediatric patients had received their transfusions at the time of birth. Whether this observed increased risk is related to an increased susceptibility due to an immature immune system, to coexisting diseases, to a shorter latency period, or to other factors is unknown. The incidence rate of AIDS for those not in any of the groups listed is extremely low, about 0.1 per 100,000.

The high case fatality rate and the relative youth of those affected by AIDS leads to a dramatic effect on life expectancy in groups with a high incidence of disease. One way to examine this is with "years of potential life lost" (YPLL) before age 65, a measure of premature mortality (Table 1). In single (never-married) men aged 25 to 44 years in the United States, YPLL due to AIDS in 1984 was only slightly less than YPLL attributable to all cancers. In Manhattan and San Francisco, AIDS-related YPLL ranked above the other individual causes examined. In the United States in 1984, AIDS increased YPLL due to all causes among single men aged 25 to 44 years by at least 5 percent. In Manhattan and San Francisco this increase will be 43 and 74 percent, respectively.

Table 1. Years of potential life lost (YPLL) by cause of death and geographic area for single men aged 25 to 44 years. YPLL before age 65 can be used as a measure of premature mortality and are derived by multiplying the cause-specific number of deaths in each age category by the difference between 65 years and the midpoint age of each category. YPLL due to AIDS are for 1984; all other causes are for 1980 and were calculated from data provided by the National Center for Health Statistics.

Cause of death	United States	Manhattan	San Francisco
All	642,400	16,100	5,800
Accidents	188,000	1,400	1,500
Homicide, suicide	174,600	4,800	2,000
Cancer	39,500	800	400
AIDS	32,300	7,000	4,300

Natural History of HTLV-III/LAV Infection

Prevalence of infection by risk group. Of homosexual men tested in large cities in the United States or Europe, 17 to 67 percent have been reported to have antibody to HTLV-III/LAV, depending on the characteristics of the population (*10*). Antibody prevalence estimates in intravenous drug users in New York and New Jersey ranged from 50 to 87 percent, while prevalence in Europe is reported to be lower, 1.5 to 36 percent (*10, 11*). Persons with hemophilia A who had received clotting factor concentrates had 72 to 85 percent seropositively rates, and exposure to HTLV-III/LAV through use of cryoprecipitate has also been documented (*12*). Hemophiliacs in Europe also demonstrated serologic evidence of infection (*10, 13*).

In some developing countries such as Haiti and Zaire, the prevalence of HTLV-III/LAV antibody in adults ranged from 4 to 8 percent (*3, 14*). HTLV-III/LAV antibody was reported to have been found in 50 of 75 serum samples collected from healthy children in Uganda as early as 1972 and 1973 (*15*). Since AIDS has not been reported from Uganda, the interpretation of this finding is unclear.

In high-risk populations, infection with HTLV-III/LAV is considerably more common than AIDS. A retrospective analysis of 6,875 members of a hepatitis B study cohort in San Francisco showed that, by the time the first two cases of AIDS were diagnosed, 24 percent had antibody to HTLV-III/LAV (Table 2). In 1980, the ratio of seropositive persons to persons with AIDS was 825:1. In 1984, 68 percent of the men had

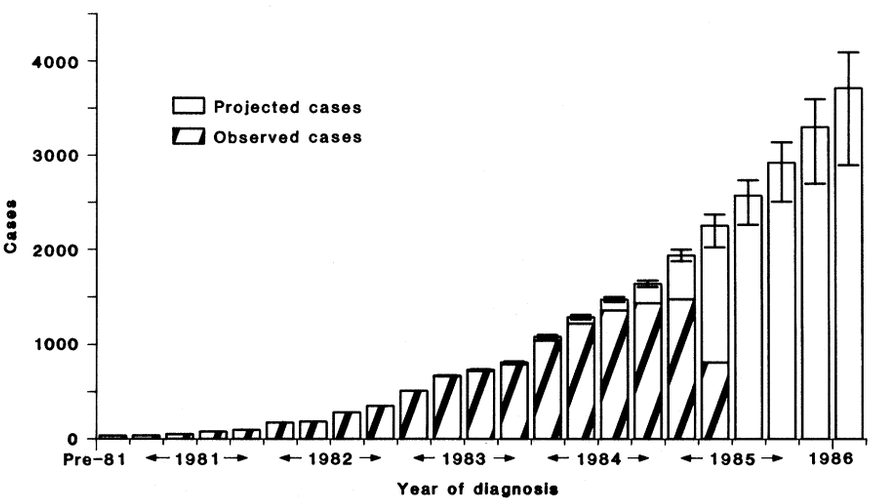

Fig. 1. Incidence of AIDS in the United States, by quarter of diagnosis projected from cases reported as of 30 June 1985. The AIDS cases in the United States reported to CDC as of 30 June 1985 (shaded bars) were used to project the number of cases expected to be diagnosed through the second quarter of 1986 (open bars). The projections were made in two stages. First, with the assumption that the distribution of delays between the actual diagnosis of AIDS and the report of these cases to CDC will remain constant over time, the cases reported each month were adjusted to obtain estimates of the cases actually diagnosed. The adjustment indicates that approximately 13,600 cases of AIDS were diagnosed as of 30 April 1985. Second, to project future cases to be diagnosed, a polynomial model was fitted to the adjusted case counts as transformed by the Box-Cox method (*4*). The transformation was used to obtain homoscedastic residuals suitable for calculating prediction intervals. The 95 percent confidence intervals for the first quarter of 1985 and before account for the expected variation in adjusting for reporting delays; the prediction intervals for the second quarter of 1985 and beyond account for the usual residual variance as well as that introduced by adjusting the case counts and applying the Box-Cox transformation. The model indicates that approximately 12,500 new AIDS cases will be diagnosed between 1 July 1985 and 30 June 1986, with a 95 percent prediction interval ranging from 10,000 to 14,000.

Table 2. Estimate of number of individuals with HTLV-III/LAV antibody and AIDS, 1978–1984 (from San Francisco CDC cohort study (n = 6875).

Variable	1978	1979	1980	1981	1982	1983	1984
Seropositive (%)	4	12	24	35*	46*	57*	68
Estimated number seropositive	275	825	1650	2406	3162	3919	4675
Cumulative number reported with AIDS	0	0	2	14	41	84	166

*Estimated.

antibody to HTLV-III/LAV, and over 2.4 percent had been diagnosed with AIDS, indicating that serologic evidence of infection was then 28 times more common than AIDS. The lag between virus infection and the occurrence of AIDS has prevented the community or high-risk population from recognizing the severity of the AIDS problem until a large number of individuals have been infected. We assume that the infection in most areas of the United States lags behind the 1984 HTLV-III infection-to-AIDS rates of the San Francisco cohort. If the infection-to-AIDS ratio is currently between 50:1 and 100:1, then it can be estimated that between 500,000 to 1,000,000 Americans have been infected with HTLV-III/LAV to date. The number of cases of AIDS projected to be diagnosed next year (Fig. 1) would then represent an annual attack rate of from 1 to 2 percent of those currently infected with the virus.

Persistence of infection with HTLV-III/LAV. Retrovirus infections in animals persist for prolonged periods, usually for life. HTLV-III/LAV infection in humans can also persist, at least for several years. The virus has been isolated months to years after the onset of symptoms from 85 percent or more of seropositive individuals with AIDS, lymphadenopathy, or other associated conditions (*3*). In investigations of cases of transfusion-associated AIDS, HTLV-III/LAV was isolated from specimens obtained from 22 of 23 seropositive blood donors an average of 28 months after the implicated donation (*16*). All but one of the high-risk blood donors were asymptomatic at the time of donation, and 15 of 22 remained asymptomatic when virus was isolated from 1 to 4 years later. In another study, HTLV-III/LAV was isolated from the blood of 8 of 12 homosexual men who had been asymptomatic and seropositive for 4 to 69 months. Low T-helper to T-suppressor ratios were most frequent in men who had been seropositive the longest (*17*). Because persistent infection with HTLV-III/LAV can be readily demonstrated in asymptomatic persons, the presence of specific antibody should be considered presumptive evidence of current infection and infectibility.

The spectrum of HTLV-III/LAV infection and AIDS. An acute mononucleosis-like illness characterized by fever, malaise, gastrointestinal symptoms, myalgia, sore throat, diarrhea, and generalized lymphadenopathy described in 11 homosexual men within days to weeks after exposure provides evidence of an acute clinical and immunologic response to infection with HTLV-III/LAV (*18*). In three of these individuals, seroconversion to HTLV-III/LAV occurred after onset of clinical and immunologic findings. These findings support the concept of an acute, transient, and generally nonspecific HTLV-III/LAV syndrome, but the time interval from infection to diagnosis of AIDS may be quite long. The median interval between receipt of blood transfusion and diagnosis of AIDS among cases reported to date is 29 months in adults and 14 months in infants (*2, 19*). However, this estimate is probably low since only cases with the shortest incubation times have been diagnosed. A recent study estimates the mean incubation period for transfusion-associated AIDS to be 4.5 years (*20*). In another study, among homosexual men developing AIDS, the average interval between seroconversion and diagnosis of AIDS exceeded 3 years (*21*).

In a representative sample of 474 homosexual men in the San Francisco cohort study, initially seen between 1978 and 1980 and enrolled in a follow-up study in 1984, AIDS had been diagnosed and reported in 2.7 percent. Another 25.8 percent had clinical signs or symptoms or laboratory evidence of AIDS-related conditions, particularly generalized lymphadenopathy (Table 3). Over 57 percent of those with no signs of illness were seropositive for HTLV-III/LAV (*21*). The estimated mean follow-up after seroconversion was just over 3 years, and approximately 3.6 percent of those with antibody have been diagnosed with AIDS.

The short-term prognosis is reported to be worse in persons who have AIDS-related conditions severe enough to require medical care. In these studies', from 6 to 20 percent of patients were diagnosed with AIDS during 2 years of follow-up (*22*). In one prospective study of generalized lymphadenopathy, patients were more likely to be subsequent-

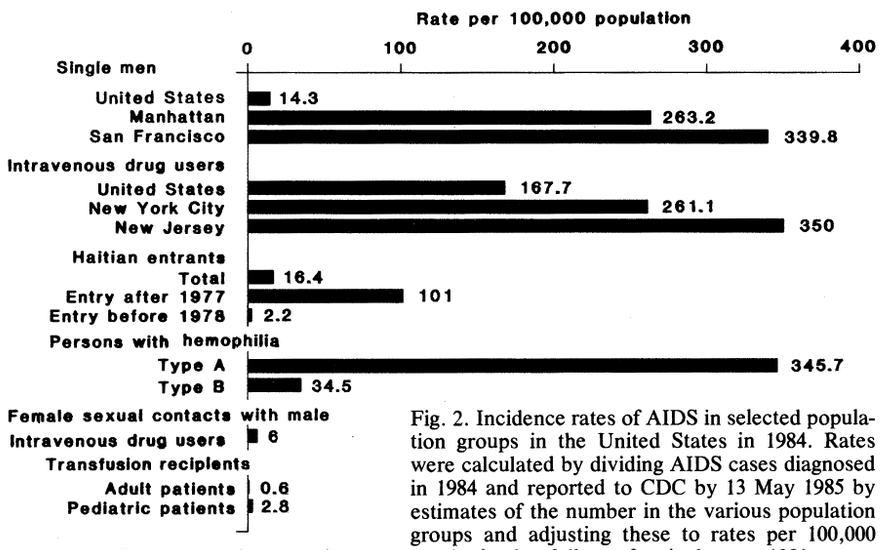

Fig. 2. Incidence rates of AIDS in selected population groups in the United States in 1984. Rates were calculated by dividing AIDS cases diagnosed in 1984 and reported to CDC by 13 May 1985 by estimates of the number in the various population groups and adjusting these to rates per 100,000 population. These denominator estimates were obtained as follows: for single men, 1980 census figures for single (never-married) men aged 15 years or older were used; estimates of intravenous drug users were provided by the National Institute on Drug Abuse, the New Jersey State Health Department, and the New York State Division of Substance Abuse Services; the figure for Haitian entrants includes legal immigrants, apprehended illegal entrants, and an estimate of undetected illegal entrants through 1984 as determined by the Immigration and Naturalization Services; an estimate of the number of persons with hemophilia was available from a survey done in 1976; the number of female partners of male intravenous drug users was assumed to be 80 percent of the total number of male intravenous drug users; for blood transfusion recipients, figures obtained from the American Blood Commission of blood recipients from 1978 to 1983 were adjusted to include only recipients who would survive long enough to develop clinically apparent AIDS (*8*).

ly diagnosed with AIDS if they initially had low T-helper cell counts, anemia, lymphopenia, and other symptoms in addition to the generalized lymphadenopathy (*22*).

Modes of Transmission

HTLV-III/LAV has been isolated from peripheral blood, semen, saliva, and tears (*23*). In most cases of AIDS in the United States, the virus appears to have been transmitted through one or more of four routes: sexual contact, intravenous drug administration with contaminated needles, administration of blood and blood products, and passage of the virus from infected mothers to their newborns. Several epidemiologic studies have identified specific behavioral risk factors for AIDS and HTLV-III/LAV infection in homosexual men (*22, 24*). An increased number of sexual partners was the most consistent risk factor associated with acquisition of infection or AIDS in homosexual men. In addition, receptive anal intercourse and other practices associated with rectal trauma often differentiated cases from controls in these studies. Heterosexual transmission of HTLV-III/LAV infection appeared to be most closely associated with being a steady heterosexual partner of a person with AIDS or of a seropositive individual in a risk group (*25*). Studies in Central Africa and the United States have also shown that sexual contact with prostitutes and large numbers of heterosexual partners are risk factors for AIDS in heterosexual men (*7, 26*).

Among intravenous drug users, the sharing of needles, presumably contaminated with infectious blood, has been implicated as a risk factor for AIDS and HTLV-III/LAV infection (*11*).

Transfusion-associated AIDS has been caused by receipt of a unit of whole blood or blood component from a donor infected with HTLV-III/LAV. Frequently the donor is asymptomatic. Patients who received blood components from large numbers of donors were more likely to be exposed. Blood components implicated in transmission include red cells, platelets, plasma, and whole blood (*2, 19*). HTLV-III/LAV infection has been transmitted to persons with hemophilia through pooled plasma products, specifically clotting factor concentrates. HTLV-III seroprevalence increases with severity of hemophilia and increased use of clotting factor (*12*). Recently, the use of cryoprecipitate has also been implicated in the transmission of HTLV-III/LAV (*2, 12*).

Table 3. Prevalence of AIDS, related conditions, and HTLV-III/LAV antibody in homosexual men, San Francisco Health Department/CDC cohort study, 1984 [adapted from Jaffe *et al.* (*17*)].

Condition*	Number of men (%)	Number of antibody-positive/ number tested (%)
AIDS	13 (2.7)	10/10 (100.0)
Generalized lymphadenopathy	98 (20.7)	82/89 (92.1)
Other signs or symptoms suggesting AIDS prodrome	14 (3.0)	11/14 (78.6)
Hematologic abnormalities	10 (2.1)	10/10 (100.0)
None of the above	339 (71.5)	180/312 (57.7)
Total	474 (100.0)	293/435 (67.4)

*If more than one condition was present, the participant was included only in the group listed first. Definitions for AIDS-related conditions were as follows. Generalized lymphadenopathy: palpable nodes of at least 1.0 cm diameter in two or more extrainguinal sites, not more than one of which was cervical. Other signs or symptoms suggesting AIDS prodrome: fever or diarrhea lasting at least 2 weeks or weight loss of at least 10 lbs in last 4 months; oral candidiasis on examination. Hematologic abnormalities: hematocrit <40.0, absolute lymphocyte count <1500 per cubic millimeter, or absolute neutrophil count <1200 per cubic millimeter.

Most infants with AIDS were born to mothers with AIDS or in high-risk groups. The occurrence of symptoms shortly after birth and the absence of cases in older children suggests transmission in utero, or during or shortly after birth (*27*). Recently, HTLV-III/LAV seroconversion was described in an infant of a mother who had acquired HTLV-III/LAV infection postnatally from a blood transfusion. It has been hypothesized that transmission occurred from the mother to the infant as a result of breast-feeding or other close mother-to-infant contact (*28*).

Epidemiologic studies of AIDS suggest that heterosexual transmission accounts for a larger proportion of cases in developing countries, although homosexual transmission, transmission through blood transfusion, and from infected mothers to newborns have also been reported. The association of HTLV-III/LAV infection with the number of injections received for therapeutic and nontherapeutic purposes in some developing countries suggests that reuse of nonsterile needles may contribute to transmission (*14, 29*).

Of the 10,533 cases of AIDS reported by 24 May 1985, 371 (3.5 percent) were in health-care workers. All but 31 (8.4 percent) of these health-care workers belonged to known AIDS risk groups. In the completed investigations of cases outside risk groups, no specific occupational exposures could be documented. Five hundred and twelve health-care workers have been enrolled in a prospective evaluation of persons exposed by a parenteral or mucous membrane route to blood or body fluids from patients with AIDS or symptoms suggestive of AIDS. Serologic testing for HTLV-III/LAV has been completed for 105, 82 percent of whom had parenteral exposure from needlesticks or cuts from sharp instruments. None of the 105 participants demonstrated seroconversion to HTLV-III/LAV after an average 8-month follow-up (*30*). In another study, none of 85 employees with nosocomial exposure seroconverted to HTLV-III/LAV, including 32 individuals who encountered needlestick accidents or other parenteral exposures to blood (*31*). A recent report, however, describes a nurse in England who developed confirmed HTLV-III/LAV antibody following a needlestick injury and exposure to the blood of an AIDS patient. This seroconversion occurred 27 to 45 days after exposure and was accompanied by lymphadenopathy and fever, consistent with the acute symptoms described with HTLV-III/LAV (*32*). From the data available, the risk of HTLV-III/LAV infection to health-care and laboratory workers appears to be small, even following parenteral exposure to blood from patients with AIDS. However, these workers should continue to follow precautions when caring for persons with definite or suspected AIDS or with serologic or epidemiologic evidence of infection and when handling specimens from these patients. Summaries of these precautions have been published (*33*). There is no evidence of transmission of HTLV-III/LAV infection from health-care workers to individuals under their care.

Although concern has been expressed that HTLV-III/LAV might be present in hepatitis B vaccine, there is now considerable evidence concerning the safety of this vaccine in regard to HTLV-III/LAV transmission. Epidemiologic studies have not detected an association between vaccine and AIDS in cases of AIDS reported to the Centers for Disease Control and in members of AIDS risk groups who received hepatitis B vaccine. Further, several of the inactivation steps used in the manufacture of the U.S.-licensed hepatitis B vaccine have been shown to reduce HTLV-III/LAV virus to undetectable levels in vitro (*34*).

Similarly, no cases of AIDS or HTLV-III/LAV infection have been attributed to the use of immunoglobulins. These

pooled products undergo fractionation with ethyl alcohol, which has been shown to inactive HTLV-III/LAV in vitro (*35*). Although high levels of antibody to HTLV-III/LAV were detected in commercial hepatitis B immunoglobulin, there was no evidence of HTLV-III/LAV transmission from this product. In 19 recipients of 31 doses of HBIG containing antibody to HTLV-III/LAV, low levels of passively acquired antibody were detected shortly after injection, but the reactivity did not persist. Six months after the immunoglobulin injection, all patients were seronegative to HTLV-III/LAV and remained clinically well (*36*).

After 4 years of close observation of AIDS in the United States, there has been no evidence of transmission of HTLV-III/LAV infection or AIDS through food, by arthropods, or from casual contact.

Determinants of Outcome Among Individuals with HTLV-III/LAV

Most individuals infected with HTLV-III/LAV do not develop AIDS within the first few years. Whether or how cofactors or host susceptibility factors increase the risk of AIDS in infected persons is unknown. The higher rate of transfusion-associated AIDS in infants suggests that infection in the perinatal period may be especially virulent, perhaps because of the immaturity of the neonatal immune system. Whether other factors that suppress the immune system, such as medical use of steroids or antineoplastic agents, other coexisting immunosuppressant diseases, severe protein-calorie malnutrition, or even old age, may increase the risk of AIDS in persons infected with HTLV-III/LAV is unknown. The occurrence of AIDS in previously healthy young persons from all risk groups, however, suggests that, while such cofactors may modify the course of infection, they are not likely to be essential for AIDS to develop in an individual infected with HTLV-III/LAV.

The rates of individual opportunistic diseases occurring in AIDS patients vary by risk groups. Tuberculosis has been reported more frequently in users of intravenous drugs and patients from developing countries, cryptococcal meningitis is more common in Africans with AIDS, and disseminated toxoplasmosis occurs in proportionately more cases among persons born in Haiti (*29, 37*).

More puzzling are the differential rates of Kaposi's sarcoma (KS). In the United States, KS has been reported in over 34 percent of homosexual men with AIDS, but only 6 percent of patients in all other groups. Both classic KS as well as KS in AIDS have been associated with the presence of the HLA DR5 haplotype (*38*), but this association cannot explain the excess occurrence in homosexual men compared with other groups with AIDS. An increased frequency of use of nitrite inhalants has been reported in homosexual men with KS compared to homosexual men with other manifestations of AIDS or with asymptomatic HTLV-III/LAV infection (*39*). In addition, cytomegalovirus (CMV) infection has been associated with classic KS, and there is a high frequency of CMV infection in homosexual men with and without AIDS (*40, 41*). Both CMV and the use of nitrite inhalants deserve further attention as possible cofactors for KS in persons with HTLV-III/LAV infection.

Prospects for Prevention and Control

Substantial progress has been made in prevention of HTLV-III/LAV transmission through blood and blood products. In March 1983, the U.S. Public Health Service advised that members of high risk groups for AIDS voluntarily refrain from donating blood (*41*). The Food and Drug Administration (FDA) also published guidelines to that effect for blood and plasma centers in the United States. Serologic tests for antibody to HTLV-III/LAV were licensed in March 1985 and are currently being used to screen blood and plasma donations in virtually every center in the United States. Preliminary results reported by the FDA show repeatable enzyme-linked immunosorbent assay (ELISA) reactivity in 0.25 percent of the first 1,100,000 units of donated blood tested (*42*). The low prevalence of repeatable ELISA reactivity is consistent with a low level of infectivity among current blood and plasma donors and indicates that discarding these units will decrease the risk of virus transmission and have minimal effect on blood supplies. The interpretation of positivity in the ELISA and the effect of notification of blood donors are currently under study.

HTLV-III/LAV is sensitive to heat in vitro (*35, 43*). Heat-treated clotting factor concentrates have been developed and are commercially available. The National Hemophilia Foundation has recommended that all patients with hemophilia be treated with these products. Preliminary follow-up studies of seronegative hemophiliacs suggest that these products do not transmit HTLV-III/LAV infection. Screening donated blood and plasma for HTLV-III/LAV and using safer clotting factor concentrates should greatly reduce transmission of HTLV-III/LAV through blood and blood products in the future. Because of the long incubation period of AIDS, however, cases in hemophiliacs and recipients of blood transfusions will continue to be reported in those who have been already infected.

In March 1983, the Public Health Service recommended that members of high-risk groups reduce the number of their sexual partners to avoid acquiring or transmitting the infection causing AIDS (*41*). Surveys confirm a substantial reduction in the average number of reported sexual partners in homosexual men during the past 2 years. During this time the number of reported sexually transmitted infections in homosexual men was greatly reduced (*44*). Cases of rectal gonorrhea in men attending the San Francisco city health department clinics declined 73 percent between 1980 and 1984. Undoubtedly this trend reflects a major change in behavior leading to transmission of sexually transmitted infections. While cases of rectal gonorrhea declined by 73 percent, the prevalence of antibody to HTLV-III/LAV in homosexual men increased 280 percent in the hepatitis B study cohort previously described. Thus, the risk of exposure to HTLV-III/LAV for homosexual men may be greater now than it was in the early 1980's despite substantial behavior changes. To be safe from risk of exposure to HTLV-III/LAV infection, persons should avoid any sexual activity that involves the exchange of body fluids, such as semen, with an individual who is known or suspected to be infected. When the prevalence of any sexually transmitted infection is high in a population, as is true with HTLV-III/LAV in homosexual men, any sexual contact with an individual whose infection status is unknown should be considered high risk. For uninfected individuals likely to continue sexual exposure to HTLV-III/LAV, such preventive measures as condoms, diaphragms, or spermicides offer some theoretical protection, but their efficacy is unproved. With other sexually transmitted infections, these measures reduce but do not eliminate the risk of infection.

The risk of HTLV-III/LAV infection and of AIDS in infants born to infected mothers is substantial but has not yet been quantified. The Public Health Service has recommended that women with clinical, epidemiologic, or serologic evidence of infection with HTLV-III/LAV should postpone or avoid pregnancy to

prevent transmission to the fetus or newborn (*45*). Women who may have been exposed should have a serologic test for HTLV-III/LAV before considering pregnancy. Premarital and prenatal screening for antibody to HTLV-III/LAV should be seriously considered by physicians or clinics providing care for women in populations with increased risk of infection, such as intravenous drug users.

Individuals with clinical, epidemiologic, or serologic evidence of infection with HTLV-III/LAV should avoid transmission to others through sexual intercourse and sharing needles and should refrain from donating blood, plasma, body organs, other tissues, or sperm (*45*). In addition, donors of organs, tissue, or sperm should be serologically tested for HTLV-III/LAV to prevent transmission (*46*).

The Future

Future strategies for preventing HTLV-III/LAV infection will involve vaccine or specific antiviral therapy, should either or both become available. Currently, preventing HTLV-III/LAV infections depends upon education and counselling to prevent sexual transmission and transmission among intravenous drug users and from infected mothers to newborns. Prevention efforts begin with providing up-to-date, accurate information and sound recommendations to individuals on how to prevent transmission. Community prevention programs must proceed now, before definitive evidence of their effectiveness is available. They should be evaluated according to their ability to prevent HTLV-III/LAV infection as well as to influence behavior. To maximize efficiency and chance for success, prevention efforts of public health agencies and community groups should be coordinated.

In the absence of vaccine or therapy, the incidence of AIDS in the United States is likely to increase during the next few years. Since HTLV-III/LAV infection has wide-ranging effects on the immune system, infection may affect the course and prognosis of other diseases; knowledge of HTLV-III/LAV infection status will become increasingly important for the management of many medical disorders. More widespread use of the serologic test will make apparent the need for carefully considered policies for safe and equitable handling of infected persons in day-care centers, schools, prisons, and chronic care institutions (*47*). Concerns about confidentiality will threaten to jeopardize research and public health control efforts unless they are adequately and credibly addressed.

It is unlikely that casual contact will play a significant role in transmission of HTLV-III/LAV infection. Current modes of transmission will remain stable, and sexual transmission of the virus will account for the vast majority of cases in the United States for many years to come. Homosexual men and persons who abuse intravenously administered drugs will remain at extraordinary risk for AIDS; the disease will probably become the major cause of death in these populations.

During the past 4 years, research has resulted in an understanding of the etiology and pathogenesis of AIDS and the modes of transmission of the virus causing it. A continued commitment to research is needed to develop a vaccine and therapy and to further understand the natural history of HTLV-III/LAV infection. Control of AIDS and HTLV-III/LAV infection cannot await the benefits of future research. There is an urgent need for community groups and health professionals to work together and utilize the tools available to prevent AIDS and care for its victims.

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