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Il existe également une édition française de cette publication.
AIDS
handbook for journalists
INTRODUCTION

This handbook is designed to help the media in their continuing coverage of the worldwide epidemic (pandemic) of acquired immune deficiency syndrome (AIDS). The general reporter or writer should find it particularly useful because it contains in concise form the principal factual information needed to understand the pandemic, together with a chronology of the main events in its history, a glossary of terms, and the names and addresses of some of the main players in the struggle to control and contain AIDS. For these readers, the handbook may serve as a sort of crash course in the elementals of AIDS. For the experienced medical or science writer, some sections may provide handy reminders of facts and dates, and the source listings may constitute a useful reference. Canada’s International Development Research Centre (IDRC), which produced this publication, hopes that its usefulness will extend far beyond the 6 days of the V International Conference on AIDS, for which it was prepared.

AIDS BASICS

What is AIDS?

In popular usage, AIDS is the name applied to a new disease resulting from a viral infection that attacks and progressively causes the body’s immune system to fail. In medical terms it is the acronym for acquired immune deficiency syndrome, a syndrome being a number of symptoms and signs that occur together and constitute a distinct clinical picture. As the body’s immune system is gradually disabled by the virus that causes AIDS, the infected person becomes vulnerable to a number of other disease agents or cancers. Some of these, although not usually fatal, become lethal to a person with AIDS. Strictly speaking, the term AIDS refers only to the last, fatal stage of this viral infection.

What causes AIDS?

AIDS is caused by a viral infection. Viruses are extremely small packets of genetic material surrounded by a protein envelope. Their genetic material is usually DNA (deoxyribonucleic acid), as it is in human cells. A virus infects a cell by inserting some of its DNA into the cell’s DNA. This is done by means of a template made of a kind of RNA (ribonucleic acid) known as “messenger RNA” (mRNA).

The human immunodeficiency virus (HIV), which causes AIDS, belongs to the family known as retroviruses. Retroviruses are so-named because, when compared with other viruses, they reverse the flow of genetic information from virus to target cell. In this virus family, the genetic material is RNA. Before this RNA can be inserted into the cell’s genetic material, it must first be converted to DNA. This is done with the aid of an enzyme called reverse transcriptase. HIV is one of the first retroviruses to have been found in humans (many are known to infect other animals) and was identified as the cause of AIDS in 1983.
Who can get AIDS?

Any human being is a potential target for HIV: man, woman, or child. The virus has already infected an estimated 5 to 10 million people and has been reported in at least 138 countries around the world (see p. 12). AIDS and the Third World, published by The Panos Institute in association with the Norwegian Red Cross, says: “Worldwide, it seems likely that a new person becomes infected with the HIV virus every minute.” The AIDS pandemic is an urgent problem in both industrialized and developing countries. World Health Organization (WHO) officials have called it “an unprecedented threat to global health.”

How is it spread?

HIV is carried in the blood and body fluids of infected persons. It can be passed from an infected person to another individual in the following ways:

- By penetrative anal, vaginal, and oral intercourse;
- Through unsterilized, contaminated hypodermic needles used for injecting drugs or vaccines, either by intravenous drug users or by medical personnel;
- Through transfusion of infected blood or blood products;
- From an infected mother to her infant before or during childbirth;
- Through transplanted organs or donated semen; and
- As a result of the use of contaminated instruments, especially in such practices as tattooing, ritual scarring, and circumcision.

How is it NOT spread?

Much misunderstanding and fear has surrounded AIDS because people have compared its means of transmission erroneously with other diseases that are relatively much more infectious. There is no evidence that AIDS can be spread in the following ways:

- By the shared use of inanimate household objects such as toilet seats or drinking glasses;
- By coughs and sneezes, as with influenza or tuberculosis;
- By insects, as with malaria or plague; and
- Through contaminated food and water, as with cholera.

How and where did AIDS first arise?

Nobody knows the answer to this question. The first cases of what is now recognized as AIDS appeared in the late 1970s and early 1980s in widely separated locations: Africa, Belgium, France, Haiti, and the United States. AIDS-like symptoms have been shown, retrospectively, to have occurred as early as 1959, and blood stored at that time has been found to contain antibodies to HIV. However, the
World Health Assembly concluded in 1987 that HIV is a “naturally occurring retrovirus of undetermined geographic origin.”

**Course of HIV Infection**

HIV infection begins when a virus attaches itself ("binds") to a molecule known as CD4 on the outside surface of a cell of the human immune system called a "helper T cell" (or T4 cell). Helper T cells are the "generals" that direct the battle between the body's defense forces and foreign invaders such as viruses and bacteria. They command the "B cells" to produce antibodies to neutralize the invaders, and "killer T cells" and "cytotoxic T cells" to destroy them. The helper T cells also control "suppressor T cells," whose function it is to "turn off" the immune response once an attack has been successfully repelled. (In HIV infections, unlike others, the antibodies produced by the immune system are unable to neutralize the virus, but their presence in the blood is a reliable indication that an HIV infection has taken place [see p. 4].)

Once bound to the helper T cell, the virus invades it and incorporates its genetic information into that of the T cell. At this point the virus is dormant. The act of uniting with the cell’s genetic mechanism makes the virus invisible to the immune system: it cannot fight what it cannot “see.” At some time in the future, responding to some as-yet unknown signal, the now-appropriated helper T cell starts producing new viruses. This destroys the T cell and frees new viruses to travel to other parts of the body. Sometimes these viruses are actually carried by the cells of the immune system, known as macrophages, whose job it is to engulf and eat invaders. HIV, alone among viruses, works in this exceptionally effective way, striking at the heart of the very system designed to protect the human body against disease, and ultimately destroying it.

Recent evidence has shown that some cell types that do not carry the CD4 molecule can also be infected with HIV: one example are glial cells, which make up part of the nervous system. Once infected, these cells can produce new viruses that either infect other cells or lie dormant within the glial cells. Infected glial cells are one suspected cause of brain damage in AIDS cases (e.g., AIDS dementia). Macrophages can be infected whether or not they have CD4 molecules on their surface. Certain cells, such as the Langerhans' cells in the outer layer of the skin and follicular dendritic cells in the lymph nodes, show limited amounts of CD4 and can be readily infected with HIV. Immature blood cells in the bone marrow (hematopoietic stem cells), fibroblasts, and bowel epithelia can also be infected with HIV. Some of these may serve as reservoirs for the virus.

**Course of the disease**

A person infected with HIV moves through a number of stages, the last of which is AIDS. A characteristic of HIV infection is that it may remain dormant for months or years; during this time infected persons may have no symptoms and show no signs of infection. They usually feel perfectly well. For some, however, the first signs soon after infection may be similar to those of infectious mononucleosis: fatigue, fever, swollen lymph glands, and perhaps a skin rash. These symptoms
may disappear and subsequent stages may include the following:

- Chronically swollen lymph nodes (lymphadenopathy) produced by hyperactivity of B cells;
- Onset of opportunistic infections, which take advantage of the suppression of the immune system — T cell count, observed in laboratory tests, is greatly reduced;
- Symptoms such as fevers, night sweats, weight loss, and oral thrush (a yeast infection inside the mouth) — severe or persistent viral or fungal infections of the skin and mucous membranes may also occur, for example, chronic Herpes simplex surrounding the anus, the genital area, or the mouth; and
- AIDS dementia, with symptoms ranging from mild confusion, memory loss, and deteriorating thought processes to personality change, premature senility, and incontinence.

HIV TESTING

Many different tests have been developed to indicate the presence of HIV in the blood. Most were developed in 1983 after the virus was identified as the cause of AIDS; these tests became commercially available in 1984. They are not infallible, sometimes producing "false-negative" results, which indicate that the virus is not present when in fact it is, and "false-positive" results, which indicate that the virus is present when, in fact, it is not.

ELISA and Western blot tests

The two most commonly used tests are the ELISA (enzyme-linked immunosorbent assay) and Western blot tests. These do not show the presence of the virus directly: they test for the presence of antibodies to HIV. Both tests rely partly on interpretation of results by the testers. ELISA is used most often as a screening tool, followed by the Western blot for verification. Used together by experienced diagnosticians, they can be highly — although not completely — accurate.

One drawback of these tests is that people infected with HIV do not produce detectable antibodies for an average of 6 weeks (some for as long as 6 months). Thus, although the virus is present in the blood, these tests cannot detect it during that period. A few individuals appear never to produce antibodies, even though the virus may be present, or may lose the ability to produce antibodies during the course of the infection.

Procedures are available to demonstrate the presence of the virus itself in the body, but they are too expensive for screening programs. Research continues on developing direct tests for the presence of the virus: eventually, such tests will probably replace the ELISA and Western blot tests because they will reduce the number of false-negative results. The risk of such a result is small, but real: the US Center for Disease Control (CDC) has estimated that, even at a rate of 1 false negative among 39 000 donated blood units, HIV could be transmitted to 465 people annually.
Many current tests are unsuitable for widespread screening in developing countries, partly because of cost (the ELISA test costs USD 1–5 — more than some African countries spend annually per capita on health care — and the Western blot, USD 30–75 each). Equipping just three laboratories for testing over 3 years in Zaire has been estimated to cost nearly USD 2 million.

Many newer tests have been developed recently. They include ELISA-like tests, the indirect immunofluorescence (IFA) test, and so-called “rapid” tests.

ELISA-like tests
Some new ELISA-like tests use synthesized HIV proteins instead of protein fragments from the HIV virus itself. Because infectious material is not used in the manufacture of these tests, less expensive laboratory equipment is required. Theoretically, they should produce fewer false-positive results because they do not contain contaminating nonviral proteins found in the original ELISA tests. These tests are now being evaluated in many countries.

IFA test
The IFA test is unique in that it is used both as a screening and as a verification test. It is used as a screening test in centres where rapid results are required but where too few tests are done to justify the purchase of ELISA-type equipment. In other centres, the IFA test is used to confirm results that have been repeatedly positive using ELISA.

Rapid tests
Rapid tests require no instrumentation and, in some cases, can be performed in less than 30 minutes. Some use proteins from HIV; others use synthetic proteins. When antibodies are present in a blood sample, particles can be seen to clump. Because these tests are fast and can be performed and read by hand, they have great potential for use by developing countries. A disadvantage is that they are more subjective and depend on the competence of those administering the tests, hence they vary in reliability. One manufacturer spots viral protein made by genetic engineering methods onto nitrocellulose. If the blood specimen contains anti-HIV antibody, it binds to the antigen, and a red dot appears. This test takes 5 minutes and is currently being evaluated.

METHODS OF PREVENTION
In the absence of a vaccine or a cure for HIV infection, preventing transmission of the virus must remain the primary means of controlling the spread of AIDS. Education is key to prevention. Governments and health authorities have certain responsibilities in this regard. However, a major route of HIV infection — and the predominant one in some parts of the world — is sexual activity. In the last analysis, therefore, a major portion of responsibility for preventing the spread of HIV infection remains with the individual, through his or her behaviour.
Government and health authorities

To prevent the spread of AIDS, governments and health authorities can

- See that blood supplies for transfusions are screened to remove those potentially contaminated with HIV;
- Ensure that health personnel follow the CDC's “Universal Precautions in the Health Care Setting and Special-Settings Precautions” or their equivalent (these cover the use of needles, scalpels, and other instruments, the handling of blood and body fluids, and many other aspects of prevention for health personnel);
- Conduct efficient educational programs that will ensure that every citizen understands HIV infection and how it is spread;
- Make condoms available;
- Make free, confidential HIV testing available along with counselling;
- Make treatment available to wean intravenous drug users off their habit and, for those who cannot or will not change their behaviour, supply sterilized needles and syringes or the means for sterilizing them (household bleach); and
- Protect HIV-infected individuals, persons with AIDS, and those who think they might be at risk from discrimination so that they can seek help.

Individuals

To prevent the spread of AIDS, individuals can

- Inform themselves about the facts of HIV infection and AIDS;
- Avoid or discontinue high-risk behaviours, which include having unprotected sexual intercourse (i.e., without using a condom) with many partners, having sexual intercourse with HIV-infected partners or with those about whose background they know little or nothing, sharing unsterilized injection equipment, and having unprotected anal intercourse with infected partners or those who risk HIV infection;
- Adopt safer sexual practices, which include using latex condoms if sexual intercourse involves a partner whose infective status is doubtful or unknown and avoiding contact with a partner’s blood, semen, or vaginal secretions;
- Undergo HIV testing and counselling if there is reason to believe one has been exposed to HIV;
- Avoid receiving medical injections with equipment not known to be sterile, or blood or blood product transfusions not known to be prescreened for HIV; and,
- If confirmed of being infected with HIV, refrain from behaviour that risks infecting others.
TREATMENTS FOR AIDS

No cure exists for AIDS. All available treatments are palliative; i.e., they relieve symptoms without getting rid of the underlying HIV infection, which destroys the immune system. In AIDS, the patient ultimately dies from one or more of a variety of opportunistic infections or cancers that take advantage of the weakened immune system to become established. These infections and cancers can be treated, their symptoms ameliorated, and the patient’s life prolonged.

Opportunistic infections common in AIDS include

- Pneumonia, especially *Pneumocystis carinii* pneumonia (PCP);
- A formerly rare skin cancer, Kaposi’s sarcoma;
- Tuberculosis;
- Parasitic infections such as toxoplasmosis (which infects the brain and can lead to seizures and coma) and chronic cryptosporidiosis (which causes chronic diarrhea);
- Fungal infections such as cryptococcosis (which causes meningitis and damages the liver, bone, skin, and other tissues) and histoplasmosis (which affects liver, bone marrow, and other tissues and causes chronic fevers);
- The viral infection cytomegalovirus (which causes pneumonia, encephalitis, blindness, and gastrointestinal inflammation); and
- Bacteria such as *Legionella* and *Salmonella*.

Conventional or experimental therapies exist for all these infections. Recent advances include the following:

- For PCP: Pentamidine, Septra/Bactrim, and Fansidar — these not only cure but also can prevent PCP if given early; Dapsone also helps;
- For cytomegalovirus: Ganciclovir, which can halt blindness induced by the virus; and
- For Herpes simplex: Acyclovir.

The number of drugs being used experimentally against HIV infection and AIDS has greatly multiplied in recent years. Such drugs fall mainly into two categories: antiviral therapies and immunomodulatory therapies.

Antiviral therapies interfere with one or more stages in HIV infection or replication. This may be done by blocking HIV attachment to the CD4 molecule of target body cells; by blocking antigens on the virus envelope; by altering the target cell membrane; by interfering with the uncoating of the virus as it enters the cell; by disrupting the translation of virus RNA to cell DNA; or by disrupting the assembly of virus particles in the body cell and their release as a free-floating virus in the body. Immunomodulatory therapies are meant to restore the body’s impaired immune functions. This may be done either by replacing depleted cells or by stimulating normal immune functions. A combination of these two approaches is also being attempted and is considered essential for the long-term control of AIDS.

Details of these experimental therapies, including some explanations of how
they are supposed to work, are available in the *AIDS/HIV Experimental Treatment Directory* of the American Foundation for AIDS Research (AmFAR) and the annual *Directory of Antiviral and Immunomodulatory Therapies for AIDS* of CDC. The latter appears in *CDC AIDS Weekly*, published for subscribers in 42 countries (see Information Sources, pp. 19–25).

**Antiviral therapies**

The most widely used drug in AIDS treatment is zidovudine, formerly called azidothymidine (AZT), sold under the trade name Retrovir. Originally developed in 1964 as a cancer treatment, it works by inhibiting the HIV enzyme reverse transcriptase, thus slowing the replication of the virus. Advantages of AZT include the following:

- It is administered orally;
- It can reach the brain, which not all drugs can do because of the so-called “blood-brain barrier,” and thus help those with HIV-caused brain damage; and
- It can improve the quality of life and prolong life in some AIDS patients.

Disadvantages of AZT include

- It is toxic to the bone marrow, sometimes causing anemia severe enough to require blood transfusions; and
- It produces severe side effects ranging from nausea, loss of appetite, and insomnia to lung complications and severe toxic interactions with other drugs.

AZT belongs to a class of reverse transcriptase inhibitors known as dideoxynucleosides. These molecules closely resemble the nucleotides that serve as the building blocks of DNA and RNA. Other dideoxynucleosides also are active against HIV and appear to work by similar mechanisms. They could prove to be potent drugs against HIV and are being investigated for this application.

One example, dideoxycytidine (ddC), is being evaluated for use alternately with AZT. The two agents have similar sites of activity but different side effects. Administering ddC and AZT alternately might keep side effects to a minimum while maintaining maximum antiviral activity. Another modification of AZT therapy is to combine it with an agent that stimulates the formation of granulocyte macrophages. In yet another approach, AZT is being tested on some individuals early in the course of their HIV infection, even before they show disease symptoms, in the hope of prolonging the asymptomatic phase or reducing the severity of the disease.

Ampligen is another agent designed to interfere with viral replication. It is made up of mismatched double-stranded viral RNA, which is believed to disable the viral RNA in the cells so it can no longer be transcribed into DNA.

Agents designed to block the interaction of the virus and the cell include soluble CD4, monoclonal antibodies, peptides, and polysaccharides.

- **Soluble CD4** is a fragmented form of the host cell receptor, produced in the laboratory through recombinant-DNA technology, that could saturate the
binding sites on free HIV, thereby decreasing the number of virus particles that could infect CD4-bearing cells.

- **Monoclonal antibodies** are highly specific antibodies made in the laboratory by recombinant-DNA technology. They can be made to bind to HIV and interfere with its infection of cells.

- **Peptides**, or synthetic strings of amino acids, corresponding to parts of the HIV envelope could stimulate antibody formation against HIV.

- **Polysaccharides**, or sugars, that are contained in the HIV envelope could interfere with HIV infection of cells.

Lipids and fatty acids have been used to interfere with the synthesis of the outer envelope of the virus, which is rich in these substances. Other agents are being investigated in attempts to inhibit the synthesis of the envelope or to damage the membranes of HIV-infected cells.

**Immunomodular therapies**

Interferon, produced by the body to fight viral infections, has been synthesized in various forms and is being used experimentally in HIV therapy. Interleukin-2, a natural substance produced by T cells that has antiviral effects, has also been synthesized and tested as a therapeutic agent.

Substances called granulocyte-mono nuclear colony stimulating factors (GM-CSF) can accelerate the maturation of stem cells in the bone marrow. These stem cells produce the immune system's T and B cells, which are often depleted in HIV infection.

Experimental immunomodulators include

- **Ammonium trichloro tellurate** (AS-101), which stimulates interleukin-2 production and inhibits HIV growth in infected cells;

- **Imreg-1**, the trade name of an extract from healthy white blood cells, which stimulates interleukin-2 and interferon production; and

- **Imuthiol**, marketed by the Merieux Institute, France, which is a sulfur-containing compound that increases CD4 cell count.

Many of the agents that have shown activity against HIV in the test tube are now being tested in clinical trials. Such trials are designed first to show how the drugs work in the body, then whether they are toxic and how high a dose can be tolerated, and finally how effective they are.

**Possibility of a vaccine**

Although no vaccine is commercially available against HIV infection, several experimental vaccines are currently being tested in humans. However, the development of a successful AIDS vaccine involves particular difficulties:

- HIV infects some of the very cells (helper T cells and macrophages) that a vaccine needs to activate. Some researchers fear a vaccine could actually enhance the infectivity of the virus or the progress of the disease.
The virus can become invisible to the immune system by uniting its genes with those of its host's cells, where it can lie dormant for a long time.

The virus is able to mutate quickly and repeatedly. HIV confuses the immune system by changing the composition of its protein envelope, by which it is normally recognized. It can do this even within the body of an individual during the course of the infection. A vaccine must be able to recognize all the innumerable variants the virus may adopt.

There is no good animal model for the disease, in which these ploys — and defense strategies against them — can be studied. For unknown reasons, most animals do not get AIDS from HIV. Recent work suggests the possibility of using mice as a model (see p. 17).

There are concerns about clinical trials. For example, because the disease's latent period can last for years, how long should researchers wait before concluding a trial vaccine has been successful?

There may be a shortage of volunteers. Healthy people may be reluctant to try a vaccine not proved to be efficacious, and there may not be enough people in the high-risk categories to provide statistically significant results. Each experimental vaccine requires 50–100 low-risk volunteers for the first phase of trials; the final phase may require thousands of people. Each volunteer can take part in only one trial.

There are also problems involving liability for vaccine-related injuries and subsequent compensation.

Vaccine testing would best be performed in populations in which HIV infection is widespread — primarily developing countries. Such populations would risk exploitation by unscrupulous researchers using an inadequately tested vaccine or unethical procedures. Such testing might also suggest that the rich countries were using the poor as guinea pigs.

Assuming a vaccine could successfully be developed, other difficulties would remain:

- Its cost could be extremely high. How would it be paid for?
- To whom would it be provided? Everyone or only high-risk groups? Who would decide? How would administration be carried out among millions of people, a majority in remote rural areas?
- In some countries, the prevalence of HIV infection is so great that almost the entire population would need the vaccine; the expense would be enormous. However, not to administer it could be considered unacceptable to society.

A vaccine works by stimulating the immune system to react against the disease agent it has been designed to combat. It does this by introducing into the body something that is harmless but that "looks" to the immune system like the disease agent. In polio vaccines, for example, this "something" can be a "killed" polio virus or a live, attenuated one. Early vaccines were prepared by killing or weakening ("attenuating") the infectious organism or extracting some component from it that would produce an immune response in the body. Modern techniques of genetic engineering allow researchers to isolate the gene in the infectious agent that produces the specific component they want and manufacture it in quantity. This
method eliminates the possibility that the vaccine itself will be infectious. In the case of a virus, the components chosen are often proteins from the outer coat or envelope.

Experimental HIV vaccines have used an envelope protein called gp120 (or another called gp160), which binds the virus to its target cells by means of the cell surface protein marker CD4. The idea is to interfere with the virus’s entry into the cell. This works in test-tube experiments but, unfortunately, it has not worked in experimental vaccines with monkeys. It does succeed in producing antibodies in the monkeys but it does not prevent them from becoming infected with HIV.

This seems to confirm what has been observed in humans: that although people infected with HIV produce antibodies, the antibodies fail to protect them against the progress of the disease. HIV seems to have evolved a way of coexisting with the immune response of its host.

How is this done? The following possibilities exist:

- The parts of the virus recognized by the immune system may change over time (“antigenic drift”) and become unrecognizable;
- Several types of HIV may infect the same person and, as one type is attacked, another shows up;
- As the immune system kills off cells actively reproducing viruses, other viruses in other cells remain latent and unrecognized, only to appear later; or
- Some HIV particles may succeed in hiding their identification marks from the immune system, as in those that are engulfed by macrophages and “hitch-hike” in these normally defensive cells.

Despite these formidable difficulties, researchers are continuing to develop a vaccine against HIV. At least 23 projects are currently under way in different parts of the world. Most use one of the following approaches:

- Parts of HIV are employed with an adjuvant (which heightens their visibility to the immune system). The first AIDS vaccine to enter clinical trials in the United States used a portion of a viral coat protein plus the simple household chemical, alum, as an adjuvant. Begun in October 1987, results so far are inconclusive.
- HIV parts are inserted into another type of virus, e.g., vaccinia (cowpox) virus, that has been rendered harmless. This makes the coat of the vaccinia virus (the vector) look to the immune system like that of HIV. The first AIDS vaccine trials on humans anywhere in the world, in Zaire in 1986, used an attenuated vaccinia virus as the vector. Inoculation was followed by injections of a booster of purified HIV coat protein and T cells taken from the same individual and killed before reinjection. This approach is too complex to be feasible in a practical vaccine. Other virus vector vaccines are being tried elsewhere in the world.
- Anti-idiotype vaccines produce antibodies resembling CD4, the binding site for HIV on the helper T cell. Known as “anti-idiotype antibodies,” they act as decoys. When produced by the vaccine, the decoys lure free virus particles in the blood away from their true targets and tie them up by binding with them.
• To meet the problem of HIV changing its characteristics (antigenic drift), researchers are trying to develop vaccines made of parts of HIV that remain unchanged from strain to strain. One example is a portion of the envelope known as a "signature" protein. Another is a protein found just beneath the surface of the envelope that is not as susceptible to variation as are surface proteins.

• Because of the risks of inoculation of uninfected people, vaccination with "killed" HIV would be suitable only for boosting the immune reaction of people already infected with the virus, as is done, for example, with rabies infections.

Early optimism that a vaccine might be developed within a decade has faded somewhat. Those involved in research still believe a vaccine is possible, but many now feel it may take longer than first expected. The Surgeon General of the United States, C. Everett Koop, has warned the public not to expect a vaccine before the end of this century.

AIDS TODAY

The World Health Organization regularly publishes international AIDS statistics under the WHO Surveillance Program. Other sources of such data are the CDC Weekly Surveillance Report; CDR-AIDS, United Kingdom; the University of New South Wales, Australia; and the Federal Centre for AIDS, Ottawa, Canada.

Official figures do not, however, tell the whole story. For a variety of reasons, not all AIDS cases are reported. WHO estimates that, worldwide to the end of 1987, it had received reports of only about half of all AIDS cases. In addition, numbers of HIV infected individuals are largely estimates. Many more people may actually be infected than those who are known to be as a result of HIV testing, not only because they may not have access to testing or they may not present themselves for tests, but also because of the long latent period between the time of infection and the production of antibodies.

As of 3 January 1989, the official world total of reported AIDS cases was 134 595; WHO estimates the true number at 250 000. The number of HIV-infected people worldwide is estimated by WHO to be between 5 and 10 million. WHO also expects a million new AIDS cases within the next 5 years.

The official figures show that, among the continents, North America (Canada, USA, and Mexico) reported the largest number of AIDS cases at the beginning of 1989, 86 231. Africa was next with 20 807, Europe followed with 17 200, South and Central America reported 8 852, Oceania, 1 180, and Asia, 325. Among individual countries, the United States reported the largest number of cases: 82 406; this was followed by Uganda, 5 508; France, 4 874; Brazil, 4 436; Tanzania, 3 055; Italy, 2 835; Kenya, 2 732; the Federal Republic of Germany, 2 668; Malawi, 2 586; Canada, 2 323; Spain, 1 850; the United Kingdom, 1 794; Mexico, 1 502; Haiti, 1 455; Burundi, 1 408; Congo, 1 250; Australia, 1 079; and Zambia, 1 056. All other countries reported fewer than 1 000 cases.

The rate per million population showed quite a different picture, some countries
with small populations having very high rates. French Guyana, for example, headed the list with a rate of 1412.5 per million, although its total number of AIDS cases was only 113. Similarly, Bermuda, with only 81 cases reported, ranked second at 157.1 cases per million inhabitants. The rate per million in the United States was 329.6.

**AIDS in the Third World**

Although AIDS is a worldwide threat, it is potentially most damaging to developing countries. There are many reasons for this:

- Developing countries have the least economic and human resources with which to meet the threat. In some developing countries only 30 to 35% of the people are reached by modern health services.
- AIDS attacks primarily a country’s most productive and promising citizens: the young and those in the prime of life. These are precisely the people developing countries can least afford to lose.
- The prevalence of AIDS is increasing and the resources devoted to stopping it will sap already badly overstrained national economies.
- The drain on resources will also erode already-won development gains.
- By weakening their immune systems, HIV infection threatens to make Third World people more vulnerable to other diseases that are already rampant (e.g., tuberculosis).

**Variations in the pandemic**

Many differences in the characteristics of the AIDS pandemic have been observed. These variations are seen in different geographic regions of the world and among different groups of people.

At least two viruses are involved. The first human AIDS virus identified is known as HIV-1. It is the cause of most AIDS cases in North America, Europe, East, Central, and Southern Africa, and the Caribbean. In 1985, another virus was identified, HIV-2. It appears most commonly in West Africa but has also been found elsewhere. The two viruses have distinct differences, HIV-2 bearing a closer resemblance to a monkey virus, simian immunodeficiency virus (SIV). HIV-2 is understood to have appeared before HIV-1. HIV-2 also seems to be less virulent than HIV-1 and is less easily detected by the screening tests currently available. Some individuals in Africa are infected with both HIV-1 and HIV-2, and researchers are investigating whether there can be an interaction between the two.

Differences in clinical manifestations appear. For example, in North America, Kaposi’s sarcoma is seen much more frequently among homosexual men than among haemophiliacs who have contracted AIDS through blood transfusions. *Pneumocystis carinii* pneumonia accounts for more than half of all initial AIDS diagnoses in the United States but is less common than other infections in Africa.
and Haiti. A yeast-like fungus, Candida, and cryptococcal meningitis are common AIDS-related infections in Africa.

**Transmission routes differ.** The majority of AIDS cases in North America and Europe have occurred among homosexual men; in Africa, however, transmission of HIV occurs primarily among heterosexuals. In the United States and, to a lesser extent, in Europe, illegal intravenous drug use is an important route of HIV transmission: drug users often share syringes and needles without disinfecting them. This is not a big problem in Africa, but the AIDS virus may still be spread there through infected needles and syringes reused for medical injections because of shortages or lack of sterilization equipment. Sexual intercourse with intravenous drug users is a major portal of entry for HIV into the heterosexual community in the United States, but not in Africa.

**Blood and blood product transfusion risks differ.** Infection through blood transfusions is no longer a serious danger in developed countries because of screening programs that minimize the chance of infected blood and blood products being used. In developing countries, however, such screening programs are frequently impossible because of cost, and the risk of HIV infection through blood transfusion from unprotected blood supplies can be considerable. Yet, transfusions are often used more freely than in the industrialized countries. Reasons include a high incidence of serious road accidents; long delays between obstetric and other bleeding and arrival at a hospital; and the frequent occurrence of severe anemias. Because of shortages of funds and sometimes inadequate training of health personnel, injection equipment may also be reused without sterilization in developing countries, thus enhancing the possibility of HIV transmission.

**Traditional medical practices in some countries pose a danger:** they may involve the use of unsterilized equipment for injections or for cutting the skin in administering folk remedies; this could transmit HIV from person to person. A similar problem is involved in ritual scarification.

**Some populations in developing countries are at particularly high risk of HIV infection because of problems endemic in such areas:** political insecurity, famine, and war tend to displace people and separate families, thus increasing the likelihood of multiple sex partners. The heavy Third World reliance on giving medical treatment by injections (because people there have been led to believe it to be the most efficacious route) may help to spread HIV infection.

**HIV prevalence differs.** Blood studies have indicated that between 10 and 20% of the total adult population may be infected in some developing countries. Yet, prevalence in other developing countries (in Asia) is still quite low. Urban populations show a higher prevalence than rural ones. Extremely high rates of infection have been shown among selected groups of prostitutes in some countries (up to 88%).

**Infection patterns**

The World Health Organization describes three broad patterns of infection. **Pattern I** is typical of large, industrialized countries with large numbers of AIDS cases, including the United States, Canada, Mexico, many Western European countries, Australia, New Zealand, and parts of Latin America. Some unindustrialized North African countries also exhibit this pattern. This pattern
involves areas where the virus has been present for several years and where the major groups infected are homosexual and bisexual men and intravenous drug users. Heterosexual spread occurs among a small, but increasing, percentage of cases. Transmission by blood and blood product transfusion was initially important but has now been almost eliminated. The male–female ratio of infection ranges from 10:1 to 15:1. Perinatal transmission is not common. Overall HIV infection is less than 1% (calculated from blood test prevalence), but more than 50% among groups practicing high-risk behaviour (men with many sex partners and intravenous drug users who share unsterile equipment).

**Pattern II** is typical of some areas of Central, Eastern, and Southern Africa and, increasingly, of Latin American countries, particularly in the Caribbean. Most cases appear to be among heterosexuals. The ratio of infected males to females is approximately 1:1. Spread also can occur through nonsterile injection equipment, either in medical care, among traditional healers, or through unscreened blood transfusion. Transmission through homosexual activity or intravenous drug use is either absent or at a very low level. Because many women are infected, the virus is passed from mothers to infants.

**Pattern III** prevails in areas of Eastern Europe, Northern Africa, the Middle East, Asia, and most of the Pacific excluding Australia and New Zealand. In this pattern, HIV was probably introduced later than in patterns I and II, so only a small number of cases have been reported. Infection has usually come from travel to, or sexual partners from, pattern I or II areas. Some cases are caused by imported blood or blood products — in a few pattern III countries this has been the chief transmission route.

In developing countries, the threat to children is particularly great. The weakened immune systems of HIV-infected children may increase their susceptibility to diseases normally preventable through vaccination. Some fear that early childhood vaccination, particularly where a live vaccine is used, could actually cause in the child the very disease the inoculation is supposed to prevent. (There is no evidence that this has yet happened and a study presented to the IV International Conference on AIDS recommended continuing measles vaccination programs.)

Breast-feeding has been considered by some to present a dilemma. WHO issued a statement in June 1987 stating

The possibility that HIV could be transmitted through breastfeeding, or breast milk, is supported by a report that HIV can be cultured from breast milk of mothers who are themselves infected. At present, the risk of HIV infection from mothers to infants through breastfeeding has not been defined, but available information suggests that if such transmission occurs, the relative contribution of this route is very small, as compared with in utero and intrapartum transmission (before, or during, birth). For example, a substantial number of infants born to infected mothers have been breastfed without their having any evidence of acquiring HIV infection....

Additional epidemiological and laboratory research is needed, WHO concluded, but given the advantages of the practice, “breastfeeding should continue to be promoted, supported and protected in both developing and developed countries.” Research has shown that bottle-fed babies in the Third World are twice as likely to die, on average, as breast-fed babies because of a number of factors, including infection from contaminated bottles or of the water mixed with the milk powder.
The AIDS pandemic has resulted in important differences in the way the disease, and the reporting of it, is regarded by people with different origins and backgrounds. These differences have been described in some detail in *Blaming Others: Prejudice, Race and Worldwide AIDS*, published by The Panos Institute of London, Paris, and Washington. The following extract describes its overall orientation:

*Blaming Others* examines how racial and ethnic aspects of AIDS have affected the course of the pandemic so far. Important parts of the book have been written by journalists and researchers from Africa, Latin America and Asia, and from US ethnic minority communities.

*Blaming Others* recognizes that many aspects of AIDS are racially and ethnically sensitive, so much so that individuals and governments sometimes respond to factual discussion as if it implied moral judgements against groups of people or whole communities. Sometimes discussion is motivated by deliberate racism, or by inbuilt prejudices of which the speaker is unaware. And sometimes a listener reads moral criticism or condemnation into humanitarian concern.

Journalists interested in these aspects of the AIDS pandemic will find this book a useful resource.

**MAJOR RESEARCH PROBLEMS**

Medical scientists agree that enormous progress has been made within a remarkably short period of time in understanding HIV. Dr Lewis Thomas, President Emeritus of the Memorial Sloan-Kettering Cancer Center, said in a November 1988 essay in *Scientific American*,

In a long lifetime of looking at biomedical research, I have never seen anything to touch the progress that has already been made in laboratories working on the AIDS virus. Considering that the disease was recognized only seven years ago and that its agent, HIV, is one of the most complex and baffling organisms on earth, the achievement is an astonishment... [However, this work] is in its early stages, and there is an unknown distance still to go.

To design new and more effective therapies for the various stages of the disease, and to develop a vaccine that would prevent it from occurring in the first place, much more detailed information is needed about HIV and about the way the human immune system works. Many biomedical puzzles remain:

- What is the function of the novel genes found in HIV for the first time in any retrovirus? An explanation would help develop ways of inhibiting virus replication.
- What is the origin and significance of variations in HIV gene sequences? An understanding of this question would help in vaccine development.
- How is the latent virus in a body cell is activated? Knowing this might allow the process to be interfered with.
- What are the roles of the regulatory genes found in HIV-2? Although they are assumed to be analogous to those found in HIV-1, this has not been shown. HIV-2 also has a distinctive gene not found in HIV-1, called the
X gene, whose function is not known. Answers to these dilemmas should improve the treatment of HIV-2 infection.

- How does the virus’s gp120 molecule binds to the target cell’s CD4 surface protein? An answer could help therapeutic prevention of such binding, which is necessary for infection of the cell.

- How does HIV RNA translate into DNA and become part of the cell’s genetic machinery? A better understanding of this process might lead to ways in which to inhibit it, thus preventing HIV infection.

- How are HIV components assembled in infected body cells during replication?

- Why are HIV-infected individuals more or less infectious over time, and what factors determine whether such a person will transmit the virus to others?

- What causes the progression to full-blown AIDS in HIV-infected individuals and why does this vary from individual to individual?

- What is the precise method by which HIV destroys or inhibits the immune system’s cells?

- Are there genetic or environmental cofactors that affect the development of disease in HIV-infected individuals?

- Which HIV genes allow the virus to establish a persistent infection and cause immunodeficiency?

- Why is the heterosexual spread of HIV so prevalent in some geographic areas and not in others?

- Why do some individuals seem more susceptible to HIV infection than others, and why do some seem to be more efficient transmitters of the virus than others?

- Will all children who are infected by their mothers progress to AIDS and eventual death? What are the effects of HIV infection on the course of a pregnancy? How does pregnancy affect the course of HIV infection?

A major problem in studying HIV infection and AIDS is the lack of a suitable animal model. So far, rhesus monkeys have been found to respond most like humans in terms of retroviral infection and the illness caused by exposure to the simian virus, SIV. However, exposing the monkeys to HIV does not produce an immunodeficiency comparable to AIDS. Chimpanzees have been experimentally infected with HIV, but they have not developed AIDS (they are also costly to buy and maintain). Recently, US and Italian researchers found that rabbits could be infected using injections of HIV-infected human cells. It is not yet known whether the infection will produce HIV-like consequences in the rabbits. The best choice for a laboratory model, however, would be mice: they are plentiful, inexpensive, and much is known about their immune systems.

Social, psychological, legal, and ethical problems

HIV infection and AIDS have produced a multitude of problems of enormous complexity that cannot be solved entirely by biomedical science. These involve
psychology, sociology, ethics, and the law. Because the AIDS epidemic is worldwide, such problems are, in addition, perceived in different ways by people with different cultural backgrounds. Prominent among these unsolved problems are the following:

- **Sexual behaviour** — Because no cure exists for HIV infection and AIDS, the spread of the infection must be controlled primarily through education. A host of questions remain about how best to do this with different groups of people. New approaches to sexual and health education are needed, as are methods of communicating information in varying circumstances.

- **Drug abuse** — One of the most efficient ways of spreading HIV is through the sharing of unsterilized drug paraphernalia. Despite the consequent risk to themselves and others, this group remains highly resistant to behavioral change. Why is this and how can change be encouraged?

- **Families** — Family members and family relations suffer enormously from HIV infection. Variations in the kinds of problems presented are as numerous as families themselves; they also vary tremendously from one culture to another. Ways of dealing with these problems require much more attention than they have so far received.

- **Confidentiality** — Because of the dire effects the discovery of HIV infection may have on an individual, new approaches are needed on the confidentiality of such information. Similarly, the AIDS pandemic has raised new, unanswered legal and ethical questions.

- **Developing countries** — Third World countries have a host of special problems, not the least of which is the effects of the pandemic on economic and social development.

- **Economics** — The economic impact of AIDS, through health care and insurance costs, loss of productivity, and other factors, poses many problems. Little research has yet been done to help provide solutions to these problems.

- **Medical practice** — AIDS malpractice cases have begun to appear, and could be a growing problem. *AIDS Alert*, published by American Health Consultants in December 1988, reported that about 25 cases were in litigation in the USA. A more general problem is the wish of some health-care workers not to offer their services in AIDS cases.

- **Immigration policies** — Should immigrants and long-term visitors be required to undergo HIV testing? What about tourists? Many countries already require testing of immigrants, foreign students, and foreigners entering for long-term stays. So far, most countries have accepted WHO's advice against screening tourists.

- **Marriage applicants** — Should HIV testing for marriage applicants be mandatory? In what other situations would mandatory testing be useful and fair?

- **Treatment of recalcitrants** — Should HIV-infected people who knowingly risk infecting others be quarantined?

- **Sexual partners** — Should sexual partners of those found on testing to be HIV-infected be notified and offered testing and counselling?
The public good — How can the public good be balanced against individual rights to protect both uninfected and infected individuals?

INFORMATION SOURCES

An enormous amount of information on AIDS is available through a variety of sources. This handbook lists a selection of major research and information centres, important books and research papers, periodicals, on-line data bases, CD ROMs (compact-disk, read-only memory), and films. It would be impractical to try to list the names of all those engaged in AIDS and HIV research. However, most investigators are either associated with the research institutions listed and can be reached through them or through their affiliations as shown on their publications. Because of a lack of space, this list is by no means exhaustive. It was compiled on the basis of the prominence of the individuals, institutions, and publications in their fields and their perceived usefulness to journalists.

Major research and information centres

Center for Disease Control — Contact: Donald A. Berreth, Director, Office of Public Affairs, 1600 Clifton Road, NE, Building 1, Room 2067, Atlanta, GA, USA 30333 (phone 404-329-3286).

Duke University Medical Center — Contact: Kay Miller, Director, Public Relations, Durham, NC, USA 27710 (phone 919-684-3384).

Federal Centre for AIDS, Ottawa, Ont., Canada K1A 0L2 (phone 613-957-1772).

Harvard University Medical School — Contact: Lillian F. Blacker, Director, News Office for the Medical Area, 25 Shattuck Street, Room 001, Boston, MA, USA 02115 (phone 617-732-1590).

Institut de médecine tropicale Prince Léopold, Nationalestraat 155, B-2000 Antwerp, Belgium (phone 03-238-58-80).

Institut de recherches cliniques de Montréal, 110 avenue des Pins Ouest, Montreal, Que., Canada H2W 1R7 (phone 514-842-1481).

Institute of Cancer Research, Chester Beatty Laboratories, Fulham Road, London SW3 6JB, UK (phone 01-352-8133).

International Development Research Centre, 250 Albert Street, PO Box 8500, Ottawa, Ont., Canada K1G 3H9 (phone 613-236-6163).

International Planned Parenthood Federation — Contact: Dr Tony Klouda, Regents College, Inner Circle, Regents Park, London NW1 4NS, UK.

Johns Hopkins Medical Institutions — Contact: Joann Rodgers, Director, Media Relations, Office of Public Affairs, 550 North Broadway, Baltimore, MD, USA 21208 (phone 301-955-8659).

McGill University — Contact: Jean-Pierre Morin, Director, Public Relations, Burnside Hall, Room 110, 805 Sherbrooke Street West, Montreal, Que., Canada H3A 2K6 (phone 514-398-6747).
Memorial Sloan-Kettering Cancer Center — Contact: Sally Benjamin Young, Manager, Media Relations and Special Projects, 1275 York Avenue, New York, NY, USA 10021 (phone 212-207-3628).

Muhimbili Medical Centre, University of Dar es Salaam, CP 35091, Dar es Salaam, Tanzania (phone 49192).

National Cancer Institute — Contact: Office of Cancer Communications, Bethesda, MD, USA 20852 (phone 301-496-6641).

National Institute of Allergy and Infectious Diseases — Contact Office of Communications, 9000 Rockville Pike, Building 31, Room 7A32, Bethesda, MD, USA 20892 (phone 301-496-5717).

National Institutes of Health, Bethesda MD, USA (research here is carried out in many institutes) — Overall contact: R. Anne Thomas, Director, Division of Public Information, 9000 Rockville Pike, Building 1, Room 307, Bethesda, MD, USA 20892.

New York University Medical Center — Contact: John Deates, Director, Public Information Office, 550 First Avenue, New York, NY, USA 10016 (phone 212-340-5488).

Pan American Health Organization, 525 NW 23 Street, Washington, DC, USA 20037.

Royal Postgraduate Medical School, Hammersmith Hospital, DuCane Road, London W12 0HS, UK (phone 01-743-2030).

University of Alberta — Contact: Sandra Halme, Media Relations Coordinator, Office of Public Affairs, 423 Athabasca Hall, Edmonton, Alta, Canada T6G 2E8 (phone 403-432-2325).

University of British Columbia — Contact: Margaret Nevins, Director, Community Relations, 6327 Memorial Road, Vancouver, BC, Canada V6T 1W5 (phone 604-228-5103).

University of California, San Francisco — Contact: Carol Fox, Director, News Services, 513 Parnassus Avenue, 520, San Francisco, CA, USA 94143 (phone 415-476-2557).

University of Manitoba, Department of Medical Microbiology, 770 Bannatyne Avenue, Winnipeg, Man., Canada R3E 0W3 (phone 204-788-6444).

University of Montreal — Contact: Rejean Plamondon, Director, Office of Communications, PO Box 6128, Station A, Montreal, Que., Canada H3C 3J7 (phone 514-343-6111 ext. 401).

University of Nairobi, CP 30197, Nairobi, Kenya (phone 334244).

University of Toronto — Contact: Stephen Lindt, Senior Media Relations Officer, Public and Community Relations, Simcoe Hall, Room 133S, Toronto, Ont., Canada M5S 1A1 (phone 416-978-5948).

Walter Reed Army Institute of Research, 6900 Georgia Avenue NW, Washington, DC, USA 20307 (phone 202-576-2240).


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Important books and research papers


*AIDS and the Third World*, The Panos Institute in association with the Norwegian Red Cross, 1988. The Panos Institute, 8 Alfred Place, London WC1E 7EB, UK, or 1409 King Street, Alexandria, VA, USA 22314.


*AIDS 88 Summary: A Practical Synopsis of the IV International Conference*, Philadelphia Sciences Group, 774 N 24th Street, Philadelphia, PA, USA 19130.

*AIDS, Science and Epidemiology*, special issue of *Law, Medicine and Health Care*, a journal of the American Society of Law and Medicine, volume 14, number 5/6, December 1986.

*AIDS: The Ultimate Challenge*, by Elisabeth Kubler-Ross. Macmillan Publishing Co., 866 Third Avenue, New York, NY, USA 10022; Collier Macmillan Canada Ltd, 1125 B Leslie Street, Don Mills, Ont., Canada M3C 2K2; or Collier Macmillan Ltd, Stockley Close, Stockley Road, West Drayton, Middlesex UB7 9BE, UK.

*And the Band Played On: Politics, People and the AIDS Epidemic*, by Randy Shilts, 1987. Published by Penguin Books (New York, USA; London, UK; Victoria, Australia; Markham, Canada; Auckland, New Zealand).

*Blaming Others: Prejudice, Race and Worldwide AIDS*, by Renée Sabatier. The Panos Institute, 8 Alfred Place, London WC1E 7EB, UK, or 1409 King Street, Alexandria, VA, USA 22314.


*Confronting AIDS, Update 1988*, Institute of Medicine, National Academy of Sciences, Washington, DC, USA.


*New Scientist* — “AIDS Monitor,” a feature in this journal, carries up-to-date information on the AIDS pandemic. The 26 March 1987 issue contained a number of special articles, including "AIDS in Africa," by Jonathan Mann,

Plain Words About AIDS, 3rd edition, Whitehall Press, Sanderville GA, USA.

Prevention of AIDS and Other Viral Diseases/Prevention du SIDA et des maladies virales, Second Meeting of the Inter-University Convention held in Dakar, Senegal, December 11–12, 1987. Published in 1988 by ENDAT.M., Equipe Système et Perspective (SYSPRO), BP 3370, Dakar, Senegal, or 31, rue de Reuilly, 75012 Paris, France.

Safer Sex Guidelines, a resource document for educators and counsellors. Canadian AIDS Society, 267 Dalhousie Street, Suite 200, Ottawa, Ont., Canada K1N 7E3.

Science, a journal of the American Association for the Advancement of Science, 8 February 1988, volume 239, pp. 533–696. These pages contain eight articles by leading AIDS researchers and an editorial.

SIDA et Tiers Monde, ENDA T.M., Equipe Systeme et Perspective (SYSPRO), BP 3370, Dakar, Senegal, or 31, rue de Reuilly, 75012 Paris, France.


Periodicals

Activities Update, Global Program on AIDS, World Health Organization, 1211 Geneva 27, Switzerland.

AIDS: an International Bimonthly Journal, Gower Academic Journals, 1201 Locust Street, 2nd floor, Philadelphia, PA, USA 19107, or 34 Cleveland Street, London W1P 5FB, UK.

AIDS/HIV Experimental Treatment Directory, compiled and published by the American Foundation for AIDS Research (AmFAR), with technical assistance from the Professional Outreach Program, the National Institute of Allergy and Infectious Diseases. For information, contact Mr Mitchell Speer, AmFAR, 1515 Broadway, Suite 3601, New York, NY, USA 10036-8901.

AIDS Research Today is a monthly current-awareness service designed to provide the latest information about AIDS research. BIOSIS, 2100 Arch Street, Philadelphia, PA, USA 19103-1399.

AIDS Technical Bulletin presents a subset of the AIDS data base from the Bureau of Hygiene and Tropical Diseases, Global Program on AIDS, World Health Organization, 1211 Geneva 27, Switzerland.

On-line data bases

AIDS Daily Summary, operated by Dialcom, Inc., a member of a unit of British Telecom, includes an electronic version of CDC's Morbidity and Mortality Weekly Report and AIDS Weekly Surveillance Report and is available worldwide. Contact: Dialcom offices in the USA, Europe, and Asia. US address: Dialcom, 6120 Executive Boulevard, Rockville, MD, USA 20852.

AIDS Data Base, Bureau of Hygiene and Tropical Diseases: This bibliographic data base contains citations and abstracts of journal articles, books, reports, theses, and proceedings. It has worldwide coverage from 1984 with monthly updates, covers all public health aspects, and is available on BRS, Data-Star, DIMDI, and as part of the AIDS Library CD ROM. Contact: Bureau of Hygiene and Tropical Diseases, Keppel Street, London WC1E 7HT, UK (phone 01-636-8636, Telex 8953474).

AIDS Knowledge Base, produced by the physicians of San Francisco General Hospital, is a constantly updated textbook divided into chapters covering clinical applications, social and psychological aspects, patient-education materials, and references to current literature. It is available on BRS and as part of the AIDS Library CD ROM. Contact: BRS Information Technologies, 1200 Route 7, Latham, NY, USA 12100 (phone 518-783-1161).

AIDSLINE, from the US National Library of Medicine, is a bibliographic file focusing on biomedical, epidemiological, social, and behavioral sciences literature and is available on MEDLARS. Contact: MEDLARS Management Section, Bibliographic Services Division, 8600 Rockville Pike, Bethesda,
MD, USA 20894 (phone: 301-496-6193). The MEDLINE data base, one of
the sources for AIDSLINE, is also available on CD ROM from a number of
distributors.

AIDSQUEST is a service of the CDC AIDS Weekly, with on-line editions of this
newsletter from January 1988 and an electronic summary of AIDS statistics
updated regularly, an AIDS drug and therapy data base, AIDS documents
from the US Public Health Service, and data on AIDS meetings, periodicals,
and computer services worldwide. AIDSQUEST is the world’s largest
privately operated, AIDS-specific data base. Contact: Joe Zivny, CDC AIDS
Weekly, PO Box 5528, Atlanta, GA, USA 30307-0528.

CDC AIDS WEEKLY INFOLINE is a free service containing some of the features
of AIDSQUEST without the electronic editions of the CDC AIDS Weekly and
can be accessed from any modem by dialing 404-377-9563. Contact: Joe
Zivny, CDC AIDS Weekly, PO Box 5528, Atlanta, GA, USA 30307-0528.

EURAIDS, a European network for AIDS epidemiology, provides European AIDS
surveillance data and analyses. Developed by WHO Collaborating Centre on
AIDS in Paris in cooperation with Unité de Recherches Biomathematiques et
Biostatistiques (URBB), Paris, EURAIDS is an interactive, menu-driven,
videotex-type infobase that can be assessed by computer networks. Contact:
Angela Downs, WHO Collaborating Centre on AIDS, IMET, Hopital Claude
Bernard, 10 Porte d’Aubervilliers, 75019 Paris, France.

HEAPS on AIDS is part of the Australian Health Education and Promotion system.
Contact: Victorian AIDS Council, PO Box 174, Richmond, Victoria 3121,
Australia (phone 03-417-1759).

Info-aids, a clearinghouse for information and discussion about AIDS, includes
alternative treatments, political implications, etc. This data base exchanges
files with “AIDSNews,” one of the oldest services operated by the Institute
for AIDS Information. Contact: Ken Davis, whose network addresses are
info-aids-request@lamc.uucp and kdavis@optimis-pent.arpa.

Monthly AIDS Summary extracts data from the CDC’s Morbidity and Mortality
Weekly Report and combines it with information on the AIDS virus and
contact information for related organizations. Contact: Alan Wexelblat,
Software Technology Program, Microelectronics and Computer Technology
Corporation, 9390 Research Blvd, Kaleido II Bldg, Austin, TX, USA 78759.

CD ROMs

AIDS Information and Education Worldwide, produced by CD Resources
Inc./Decade Media, New York, NY, USA, this CD ROM contains abstracts
on social, biological, and reference aspects and 230 full-text documents from
WHO, CDC, and others. Contact: Jeanne Spala, Administrative Manager,
EBSCO Electronic Information, EBSCO Subscription Services, PO Box
13787, Torrance, CA, USA 90503.

Compact Library: AIDS is a CD ROM product of the Medical Publishing Group, a
wing of the New England Journal of Medicine. It contains the AIDS
Knowledge Base electronic textbook from the San Francisco General
Hospital, the MEDLINE AIDS subset, the AIDS Data Base of the Bureau of
Hygiene and Tropical Diseases, and full-text articles from key biomedical journals. Contact: Bart Rubenstein, The Medical Publishing Group, Massachusetts Medical Society, 1440 Main Street, Walton, MA, USA 02254 (phone 617-893-3800).

Additional information on data bases


CDC AIDS Weekly (12 December 1988): 13–16: “Twenty-six electronic services: computer readable databases and online information services.”


Films

The Canadian Public Health Association Report on AIDS/STD Education for Youth, 1987, published by the Canadian Public Health Association, contains listings of 77 films on AIDS and other sexually transmitted diseases suitable for health education programs for young people and those involved in high-risk activities. They originate in a number of countries and are available either in English or French. Contact: Canadian Public Health Association, 1565 Carling Avenue, Room 400, Ottawa, Ont., Canada K1Z 8R1 (phone 613-725-3769).

AIDS CHRONOLOGY


1981: In June, CDC reports five cases in the Los Angeles area during the previous 8 months of a rare pneumonia caused by the protozoan Pneumocystis carinii. The diagnoses were among previously healthy young homosexual men whose immune system had no apparent reason for malfunctioning. This was the first indication of what later was seen as an AIDS epidemic, caused by a retrovirus to be named HIV (human immunodeficiency virus). About the same time, CDC received reports of an increased incidence of a rare type of cancer called Kaposi’s sarcoma, also among young homosexual men.

1982: Further evidence through a case-control study that the syndrome striking homosexual men was an infectious agent and that it was transmitted through sexual relations. In this same year, the first evidence appeared of AIDS among people who had been injected with blood or blood products but had no other expected risk factors.

1982: Gallo and co-workers isolate a second type of retrovirus, HTLV-II. This virus probably causes some cases of a disease called hairy-cell leukemia, as well as
T-cell leukemias and lymphomas of a more chronic type than those linked to HTLV-I. These are spread by blood and sexual intercourse and from mother to child. Both cause disease after a long latency.

1982: Epidemiological evidence from CDC suggests that AIDS is a new infectious disease. In December, 711 cases are reported from 16 countries. CDC adopts the acronym AIDS.

1983: French researchers Francoise Barre-Sinoussi, Jean-Claude Chermann, and Luc Montagnier isolate and identify a retrovirus different from HTLV-I and HTLV-II from the swollen lymph gland of a young homosexual patient. This virus they call lymphadenopathy-associated virus (LAV). They find the virus will reproduce in blood from normal donors and detect antibodies against it in two patients.

1983: First well-documented AIDS cases are reported in the USA among heterosexual partners of male drug users, indicating that the AIDS agent could be transmitted to an infected man's heterosexual partner as well as homosexual one. In the same year, the first AIDS cases are recognized in people from Central Africa and Haiti who had no history of homosexuality or intravenous drug abuse.

1983: Montagnier and co-workers identify LAV-like viruses from five patients with lymphadenopathy and three with AIDS. They also discover the affinity of the virus for the CD4 molecule, and, through the ELISA test, the presence of antibodies against the virus in patients with the swollen lymph gland syndrome.

1984: Gallo and collaborators name the AIDS virus HTLV-III following a recommendation made at a 1983 meeting of European, Japanese, and American scientists.

1984: The Western blot technique is introduced for clinical detection of antibodies in AIDS cases.

1984: Gallo and associates find 100% of 34 AIDS patients test positive for HTLV-III antibodies.

1984: Montagnier and associates find antibodies against LAV in 74.5% of patients with the lymphadenopathy syndrome, 37.5% of patients with AIDS, 18% of healthy homosexuals, and 1% of blood donors.

1985: Genetic structure of the AIDS virus is determined. HTLV-III and LAV are shown to be essentially the same and an international nomenclature committee proposes that the virus be called HIV (human immunodeficiency virus).

1985: Heterosexual transmission of HIV is described.

1985: US Federal Drug Administration (FDA) licences the first ELISA test for HIV testing, and the test is used on 1978 blood samples from a venereal disease (VD) clinic in San Francisco. National screening of the transfusion blood supply begins in April in the USA and in November in Canada.

1985: In August, global reporting of AIDS cases formally begins at WHO.

1986: WHO's Special Program on AIDS is established. Renamed Global Program
on AIDS in February 1987, by that time, 41,919 cases have been reported from 91 countries.

1986: International Committee on the Taxonomy of Viruses proposes a compromise name for the AIDS virus: human immunodeficiency virus (HIV).

1987: The drug AZT is approved in the USA. FDA licences the Western blot test for commercial use.

1988: In March, the first experimental trial of an AIDS vaccine is reported by a French scientist, who injects it into himself to demonstrate his faith in its safety.

1988: By June, the world total of reported AIDS cases passes 100,000. WHO estimates that between 5 and 10 million people worldwide are infected with the causative virus and, of these, at least 30% will develop AIDS within 5 years. WHO stresses prevention, saying neither a vaccine nor a cure will probably be available within the following 5 years.

GLOSSARY OF AIDS TERMS

Adjuvant: A substance that enhances the immune-stimulating properties of an antigen; sometimes used in a vaccine.

AIDS: Acronym for acquired immune deficiency syndrome. A group of clinical signs and symptoms characterizing a disease caused by the human immunodeficiency virus (HIV), which attacks the body’s immune system. Without a functioning immune system, the body falls prey to a variety of infections and cancers that it usually can overcome, but that in HIV-infected individuals ultimately prove fatal. Strictly speaking, the term AIDS refers only to the last, fatal stage of HIV infection.

Antibody: A protein in the blood produced by the body to protect it against a specific foreign invader, such as a virus or bacterium. Antibodies neutralize invaders and interact with other parts of the immune system to eliminate them from the body.

Antigen: A substance that stimulates immunity through the production of antibodies and in other ways. The antigen–antibody reaction is highly specific: the antibody fits the antigen as precisely as a lock fits a key.

Autoimmune response: A response of the immune system to the body’s own tissues, which the immune system mistakenly recognizes as foreign matter.

B lymphocyte: A type of white blood cell that produces an antibody when stimulated by an antigen; also called a B cell.

Candida albicans: A yeast-like fungus that causes whitish sores in the mouth, common in AIDS. The infection is called candidiasis or thrush.

CD4 T cell: Also called helper a T cell, these cells, which coordinate the overall action of the human immune system, are the primary target of the AIDS virus, HIV. CD4 is a molecule on the cell to which HIV binds. It is also found on some macrophages and other cells, allowing them to be infected.
Cell-mediated immunity: The part of the immune response carried out by specific cells — helper T cells and killer T cells — as opposed to immunity carried out by secreted substances such as antibodies. Helper T cells orchestrate the entire immune system's defensive response; killer T cells destroy cells infected with foreign invaders such as viruses. The two parts of the immune system work together to rid the body of invading microorganisms.

Cofactor: Something that increases the likelihood that an individual will develop a disease. In AIDS, cofactors can include other sexually transmitted diseases, malnutrition, and psychosocial factors such as stress.

Cryptosporidium: A protozoan parasite that causes severe, protracted diarrhea. It is self-limiting in those with a normal immune system, but chronic with AIDS patients; may lead to severe malnutrition.

Cytokine: A hormone-like substance produced and released by certain cells to modulate the activity of all immune cells. For example, T4 cells accomplish their helping and inducing functions through cytokines.

Cytomegalovirus: A type of herpes virus formerly associated with a congenital infection in infants and with life-threatening infections in patients whose immune system had been suppressed; may produce pneumonia or infection of several body organs in AIDS patients.

DNA: Acronym for deoxyribonucleic acid: the genetic material responsible for passing on hereditary characteristics.

ELISA: Acronym for enzyme-linked immunosorbent assay, a screening test used to detect antibodies to the AIDS virus in blood.

Encephalitis: Inflammation of the brain.

Envelope: The outer covering of a virus, also called a coat.

Enzyme: A complex compound secreted by living cells that initiates or speeds up biochemical reactions.

False negative: A negative result in a single test for a condition that is in fact present, e.g., when a test for HIV antibodies shows none are present, yet the individual whose blood is being tested has actually been infected by the AIDS virus. This can happen if the individual was infected so close to the testing date that his or her immune system has not yet produced antibodies. It can also happen through malfunctioning of the test or misinterpretation of the test results.

False positive: A positive result in a single test for a condition that in fact is not present, e.g., when an HIV antibody test shows positive and the individual being tested has, in reality, not been infected with HIV. This can result from improper adjustment of the test or misinterpretation of its results.

Gene: Genetic information in the form of a nucleic acid (usually DNA) is carried in the genes. The information directs the production of a specific protein. Structural genes will direct the formation of proteins that make up the structure and machinery of an organism; regulatory genes control the timing and level of production of structural gene products.

gp120: Glycoprotein 120 is a glycosylated (sugar-containing) protein attached to
the AIDS virus envelope, with which it attaches to the CD4 binding site on its target body cells. It is attached to the envelope by another glycoprotein, gp41, which takes the form of a stem embedded in the envelope.

**Haemophilia:** A rare hereditary bleeding disorder of males caused by a deficiency in the ability to make blood-clotting proteins. Treated through transfusion of blood-clotting factors.

**Helper T cell:** A white blood cell that orchestrates the protective actions of the immune system.

**Herpes simplex:** A virus that causes an acute disease characterized by groups of watery blisters on the skin and mucous membranes of the lips or genitals. Type 1 affects mainly the lips; Type 2, the genitals.

**HIV:** Acronym for human immunodeficiency virus, the agent that causes AIDS.

**Immune system:** The natural defense mechanisms of the body, in which specialized cells and proteins in the blood and other body fluids work together to eliminate foreign substances and organisms such as viruses and bacteria.

**Interferons:** Proteins produced by the immune system that inhibit certain viral infections.

**Interleukin-2:** A substance produced by T cells that stimulates them — and some B cells — to proliferate; also known as T-cell growth factor.

**Kaposi’s sarcoma:** A cancer of the blood or the walls of the lymphatic vessels, which usually appears as blue-violet to brownish skin blotches or bumps. Before the appearance of AIDS it was rarely seen in North America and Europe, where it occurred primarily in older men of Mediterranean origin. It is now common among some groups of AIDS patients, in whom it is more aggressive than earlier forms.

**Killer T cell:** A white blood cell that kills invading organisms like viruses and bacteria at the direction of the helper T cells.

**Lentivirus:** A subfamily of retroviruses that includes some found in sheep, goats, and horses. HIV is a member of this subfamily. The name means literally “slow virus” because they work slowly; they evade the natural defense system of the body by entering some cells of the system and taking over the genetic mechanism. The virus’s own genes can rest there unnoticed for some time, later causing the cells to reproduce the virus. During this latent period, the infected individual is a carrier of the virus: he or she may not be ill but can infect others.

**Lymphatic system:** A tubular system that collects a clear fluid called lymph from tissue spaces and returns it to the circulatory system of the blood. In doing so it nourishes the tissue cells and returns waste and toxic matter to the bloodstream. Toxic matter is filtered out by the lymph nodes, where the lymphocytes, or white blood cells, are formed.

**Lymphocyte:** A white blood cell that fights infections through its response to invading bacteria, viruses, and other infectious agents. Lymphocytes are made in lymph nodes and in the thymus gland, spleen, and bone marrow.
Macrophage: A type of white blood cell that literally “eats” invading disease organisms such as viruses and bacteria. Unfortunately, it can’t seem to do this with HIV: the AIDS virus uses macrophages like taxis, traveling around the body in them to infect distant cells.

Opportunistic infection: Infections that “take advantage” of the impaired state of the immune system in persons with AIDS, whose causative organisms rarely produce disease in those with normal immune systems.

Persistent generalized lymphadenopathy (PGL): A condition common in AIDS patients. Lymph glands are swollen over a long period without apparent cause.

Phagocyte: A cell that engulfs and destroys germs, damaged cells, and foreign particles.

Pneumocystis carinii pneumonia: A common life-threatening opportunistic bacterial infection in AIDS patients.

Predictive value (of a test): The percentage of positive results that are true positives when the test is applied to a population containing both healthy and diseased subjects. It is determined by the interaction of three variables: the incidence of false-negative results in patients with disease; the incidence of false-positive results in subjects without disease; and the prevalence of the disease itself in the group examined. An ideal test would establish the presence or absence of disease in any individual screened and would never produce a false-negative or a false-positive result. No test exists that meets this ideal standard. In practice, test results are interpreted by diagnosticians, taking into account the prevalence of a disease in the population in question, the severity of the disease, the cost of the test, and the advantages and probability of early treatment.

Prospective cohort study: An epidemiological study that follows similar individuals (cohorts) over time. The researchers note who develops the health problem being studied and who does not, and compare the two groups at the end of the study.

Provirus: A precursor of a virus integrated into the DNA of an infected cell. As a result of some stimulus, the cell will begin producing complete copies of the original infecting virus.

Retrovirus: A virus that passes genetic information to a cell it has infected “in reverse” when compared with other viruses. Ordinary viruses have DNA as their genetic material, like the cells they infect. They transfer this DNA to the host cell’s DNA by means of a form of RNA (ribonucleic acid) known as m-RNA (messenger RNA). Retroviruses have RNA (ribonucleic acid) as their genetic material. They use an enzyme called reverse transcriptase to translate this RNA into DNA to take over the host cell’s reproductive machinery.

Reverse transcriptase: The enzyme produced by retroviruses that enables them to produce a DNA copy of their RNA.

RNA: An acronym for ribonucleic acid, a nucleic acid that helps control chemical activities inside the cell. One type of RNA (mRNA) transfers information
from the cell’s genes (made of DNA inside the nucleus) to direct the formation of proteins outside the nucleus. Unlike most viruses, which carry DNA inside their protein coat, retroviruses like HIV carry RNA.

Sensitivity: A blood test that is highly sensitive identifies a high proportion of infected persons being tested as seropositive. The ELISA test is designed to detect as many HIV seropositives as possible, including those whose results may be ambiguous. This is particularly important for protecting the blood supply. In Canada, licenced tests detect at least 99% of infected samples when properly performed on specimens received from persons infected at least 12 weeks earlier. However, highly sensitive tests may produce many false-positive results. The proportion of test positives that are truly HIV-positive within a given population depends upon the sensitivity of the test and the prevalence of HIV infection within the tested population: the lower the prevalence, the higher will be the proportion of false-positive results.

Seroconversion: The appearance in the blood of antibodies specific to a particular antigen. An individual who shows the presence of such antibodies through a blood test is said to have “seroconverted.”

Seropositive: A person who is shown by an antibody test to have HIV antibody in his or her blood is said to be “seropositive.”

Specificity: A blood test that shows high specificity is one that correctly identifies a large number of persons who do not have HIV infection as being seronegative. The specificity of the Western blot is very high: as done in Canada (where the prevalence of HIV infection, as shown by test results among blood donors, is very low), out of 100 persons who have tested positive on the second ELISA test, 96 will test negative on the Western blot. It is possible for the Western blot to produce inconclusive results, however, which require retesting. In Canada, this is done by the Federal AIDS Centre in Ottawa.

Syncytia: Giant cells formed by the fusion of both HIV-infected and non-HIV-infected cells. Such cell masses have no function; it is another way in which the virus kills large numbers of cells.

Syndrome: A collection of signs and symptoms that together characterize a specific disease or disorder.

tat: A regulatory gene (trans-activator of transcription) in HIV that is responsible for the burst of virus replication in HIV-infected T4 cells. Regulatory genes speed up or slow down the rate of protein synthesis. A total of eight such genes have so far been identified in HIV, those in addition to tat being gag (group-specific antigen), pol (polymerase), env (envelope), rev (regulator of virion protein expression), vif (virion infectivity factor), vpu (virion productivity factor u), and nef (negative regulatory factor). Together they regulate the growth of the virus and its relationship to its host cell. At each end of the genome are segments called LTR (long terminal repeat), thought to match nucleic acid sequences in cells to facilitate integration with cell DNA.

T lymphocyte (or T cell): An immune system cell that circulates in the blood and lymph, recognizes the biochemical identity of an invader, and then instructs
B cells to produce antibodies to neutralize it. The T lymphocytes also include the helper T cells and the killer T cells.

*Toxoplasma gondii*: A protozoan parasite that is one of the most common causes of encephalitis in AIDS patients (toxoplasmosis) in North America.

**Vector**: A living host that carries disease agents from an infected host or environment to an uninfected host.

**Virus**: The smallest of disease-causing organisms, a virus consists of its genetic material (DNA or RNA) surrounded by a protein envelope. In some viruses, including HIV, the RNA is surrounded by a protein coat within the envelope. It can reproduce only within the living cell of a larger organism. An individual virus, free of a host cell, is called a virion.

**Western blot**: A test that is used to determine the presence of antibodies to HIV in the blood. It is usually used as a supplemental test following repeated positive ELISA tests. It is more specific than ELISA, more difficult to perform, and considerably more expensive.
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