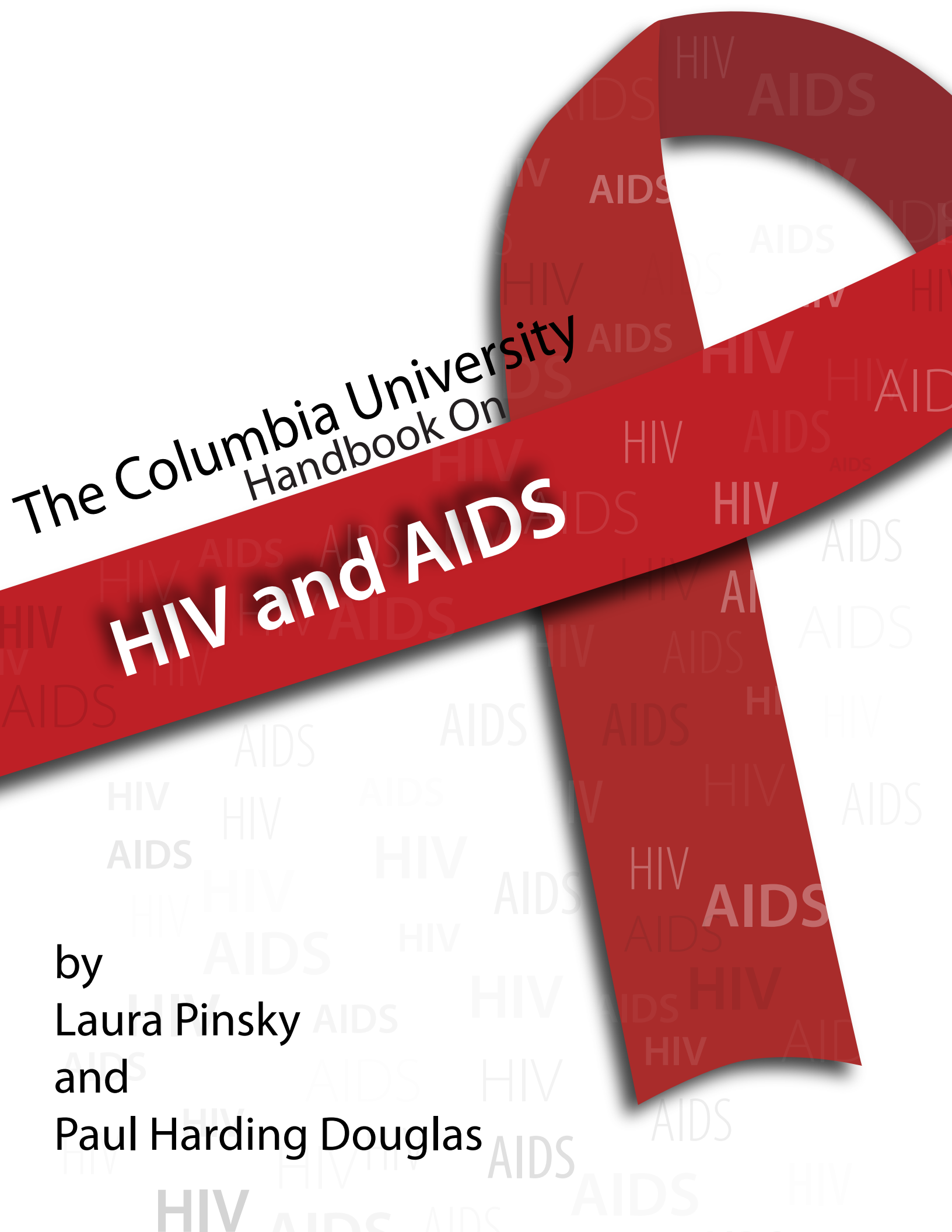

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GETTING HELP AT COLUMBIA

GHAP (the Gay Health Advocacy Project), a program of Health Services at Columbia University, is available to provide assistance with all aspects of HIV/AIDS. You can receive information, confidential antibody testing, counseling, and access to medical services for HIV-positive people. If you are positive, GHAP and Health Services will help you with all aspects of obtaining treatment and receiving practical and psychological support. You can contact GHAP at 212-854-6655.

Treatment with an HIV expert is covered by the Columbia Health Insurance plan. For people without insurance, an excellent source of high-quality care is available at the Center for Special Studies at New-York Presbyterian Hospital (http://centerforspecialstudies.com). You can use Medicare, Medicaid, or ADAP insurance at this clinic. For the uptown location (East 68th St.) call 212-746-4180; for the downtown location (West 24th St.) call 212-746-7200.

Payment for medication is available to New York State residents through the ADAP (AIDS Drug Assistance Program). This program will pay for medication for those earning under $44,000 per year. Other states have ADAP programs with different levels of eligibility. Columbia students with insurance are eligible for ADAP and will require it to pay for the full cost of medication. For information about ADAP (which also provides access to medical care), see: www.health.state.ny.us/diseases/aids/resources/adap/index.htm.

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Causes, Characteristics, and Transmission

Between 1981 and December 2007, 1,018,428 cases of AIDS were reported in the United States.[1] It is estimated that over one million Americans are infected with HIV, the virus that causes AIDS, at the end of 2006.[2,3]

Since 1995, the nature of the AIDS epidemic in the US has changed dramatically. HIV disease is no longer fatal for those receiving adequate treatment; it has become a chronic manageable disease. Effective new treatment against the virus (referred to as HAART, highly active antiretroviral treatment, or ARV, antiretroviral therapy) can limit the progression of HIV disease, thereby allowing HIV-infected people to remain healthy and greatly reducing deaths from AIDS.

The situation is drastically different in the developing nations, where 95% of cases of AIDS now occur.[4] As of 2007, there were an estimated 33.2 million people globally with AIDS and HIV. In 2007 alone, an estimated 2.1 million people died of AIDS.[5] The numbers are steadily increasing and effective treatment is not available due to economic limitations in developing nations.

WHAT IS "AIDS"

AIDS is an illness that damages a person's ability to fight off disease, leaving the body open to attack from ordinarily innocuous infections and some forms of cancers. "AIDS" stands for *A*cquired *I*mmuno*D*eficiency *S*yndrome. AIDS is caused by a virus called HIV, which stands for *H*uman *I*mmunodeficiency *V*irus. This virus infects certain types of white blood cells, principally CD4 cells (also called helper cells or T4-cells) and monocytes/macrophages. CD4 cells and macrophages both have important functions in the immune system. The disruption of the function of these cells lies at the heart of the immunodeficiency that characterizes AIDS.

HIV disrupts the functioning of the immune system. A weakened immune system allows the development of a number of different infections and cancers, and it is these diseases which cause illness and death in people with AIDS. HIV also infects and causes direct damage to other types of cells: for example, damage to the lining of the intestine can contribute to wasting (severe weight loss); damage to nerve cells can cause neurological problems.[6,7,8]

Spectrum of HIV Infection

"AIDS" is a diagnostic category constructed by the Centers for Disease Control and Prevention (the CDC); AIDS can also be referred to as advanced HIV disease. The definition of AIDS has changed over time.

Since 1993, AIDS has been defined as:

- "HIV infection and a specific group of diseases or conditions which are indicative of severe immunosuppression related to infection with the human immunodeficiency virus (HIV)"[9]

or

- HIV infection in a person without symptoms but with a significant level of immune suppression (CD4 count below 200).

People who are HIV-infected do not meet the criteria for AIDS if they are symptom-free or have symptoms that do not belong to the specified group of illnesses and have a CD4 count over 200.

We will use the term "HIV disease" or "HIV/AIDS" to mean the full spectrum of conditions caused by HIV infection, including asymptomatic HIV infection, symptomatic infection that does not meet the criteria of AIDS, and CDC-defined AIDS.

Progression of HIV Disease to AIDS

Without treatment, it appears that the majority of HIV-infected people will develop AIDS within ten to fifteen years after being infected, though some people who have been infected longer than this remain healthy even without treatment.[10] Effective treatment slows or stops the progression of HIV disease to AIDS and, for most people, seems likely to extend healthy life indefinitely.

OPPORTUNISTIC INFECTIONS AND CANCERS

If HIV infection progresses, it can cause serious damage to the immune system. As a result, certain cancers may appear and ordinarily harmless infections may be reactivated, causing serious illness.[11] These infections are referred to as "opportunistic" since, although latently present in most people, they only cause illness in people with immune impairment. Opportunistic infections and cancers are currently the cause of most deaths of AIDS patients.

Organisms that cause opportunistic infections

Type of organism	Organism	Diseases Caused
Parasites	*Toxoplasma gondii*	Disease of the brain and central nervous system
	Microsporidia, Cryptosporidia	Diarrhea and wasting (severe weight loss)
Bacteria	*Mycobacterium tuberculosis*	Tuberculosis
	Mycobacterium avium complex (MAC)	Infection of many organs, including the liver, the bone marrow, and others.
	Shigella, Campylobacter, C. difficile, Salmonella	Gastrointestinal disease, including diarrhea, inflammation of the colon (colitis), and wasting
	Streptococcus, H. influenza, Staphylococcus, Pseudomonas	Bacterial pneumonia, sinusitis, skin and bone infections
Fungi	*Candida*	Thrush, esophogitis (infection of the linings of the mouth and the throat, respectively)
	Cryptococcus	Meningitis
	Histoplasma	Lung and multi-organ infections
	Pneumocystis carinii (now renamed *Pneumocystis jirovecii*)	Pneumonia
Viruses	*Adenovirus*	Gastrointestinal disease
	JC virus	Progressive multifocal leukoencephalopathy (PML, a brain disease)
	Cytomegalovirus	Infection of the retina of the eye, colitis, encephalitis
	Herpes	Herpes, shingles, chicken pox
	Human papillomavirus (HPV)	Cervical dysplasia, genital and anal warts, squamous cell carcinoma of the anus

Treatment of most opportunistic infections has improved radically since the early days of the epidemic. Additionally, rates of opportunistic infections have dropped because effective antiretroviral treatment prevents the immune system from deteriorating.

Cancers associated with HIV disease[12]

The most frequent cancers seen in HIV-infected people are Kaposi's sarcoma (KS, a cancer of the linings of blood vessels), cervical cancer, and AIDS-related non-Hodgkins lymphoma (cancers of the lymph nodes). KS and cervical cancer usually develop when a person is immuno-suppressed and has a low T4 count. Because current treatment generally raises T4 counts, these cancers are decreasing.

KS is caused by a virus belonging to the Herpes family, HHV8. Since HAART has become effective and widely used, KS is seen infrequently, even though the rate is much higher than in the general population.

Cervical cancer is caused by infection with HPV (*human papillomavirus*). Its occurrence is also reduced by use of HAART, although the rate of cervical cancer is still ten times higher than in the general population.

Anal cancer occurs at higher rates in men who have sex with men and at especially high rates among those who are infected with HIV: sixty times higher than the general population. It is likely caused by HPV. Issues of screening for signs of this cancer are complex, and experts dis-agree about the use of such screenings.

AIDS-related non-Hodgkins lymphoma (NHL) is associated with the Epstein-Barr virus (EBV), another type of Herpesvirus. This virus infects almost all humans by early adulthood. NHL oc-curs at a higher T4 counts than the malignancies above. Rates of NHL have decreased since the initiation of HAART, but the rate is still 20 times higher among people with HIV than in the general population.

For reasons that are not currently understood, HIV-infected people appear to be at a somewhat greater risk for a number of other cancers. These include Hodgkin's lymphoma, colon, mouth, throat, lung, and kidney cancer.

For further information see:

www.annals.org/cgi/summary_pdf/148/10/728.pdf?maxtoshow=&HITS=10&hits=10&RESULTFORMAT=&fulltext=cancer+and+HIV&searchid=1&FIRSTINDEX=0&resourcetype=HWCIT

HIV and the Brain

HIV can directly damage the central nervous system (CNS), including the brain. Some opportunistic infections, particularly *Cryptococcus*, toxoplasmosis, and progressive multifocal leukoencephalopathy (PML), also cause diseases of the CNS.[13] Problems range from very mild (for example, minor problems with memory) to very severe (for example, severe memory difficulties and confusion).[14,15] Studies show that serious cognitive symptoms generally develop late in the course of HIV disease and after the appearance of other physical symptoms.[16]

TREATMENT HAS IMPROVED DRAMATICALLY

Combinations of antiretroviral medications that have been available since 1996 are slowing, stopping, and even reversing the progression of HIV disease. Generally, if you are HIV-infected and receiving treatment, you will not die of AIDS. Antiretroviral drugs are allowing many HIV-infected people (who otherwise would become ill) to live active, healthy lives with few or no symptoms. [See chapter 5 for treatment information.]

These drugs are not a cure for HIV; the medications now available must be continued indefinitely to prevent progression of the disease. Antiretroviral drugs often have significant side effects, and it is not yet sufficiently known what additional long-term side effects might occur.

HIV mutates rapidly and thus can develop resistance to drugs. Using medications in combination can help prevent such resistance. A single antiretroviral medication alone should not be used; most people currently use a combination of three or more different medications. Some people who have already developed advanced HIV disease or used drugs singly in the past do not respond to some currently available drugs or respond less well than those without prior use of these drugs.

Adequate antiretroviral medications and medical care are not available to the vast majority of HIV-infected people in the developing world, who cannot afford the drugs or the close medical monitoring required for their use.

There is ongoing research on therapeutic vaccines (that is, to treat people already infected with HIV) and on restoring immune system function.

VACCINES

Development of a vaccine to protect those not yet infected poses formidable problems. The scientific challenge is enormous, and there are ethical problems associated with testing an unproven vaccine for a dangerous disease. These factors make it unlikely that any vaccine will be widely available in the near future.

TYPES AND STRAINS OF HIV

Two types of HIV are currently recognized: HIV-1 and HIV-2. The classification is based on differences in genetic structure. HIV-2 is the less common type and is found primarily in western Africa. Both types of virus are transmitted in the same way and cause the same illnesses. However, it appears that HIV-2 is more difficult to transmit and that time from infection to illness is longer.

In addition, a number of different sub-types or strains of HIV-1 have been classified. These sub-types (also known as "clades") are distinguished by smaller variations in their genetic composition. The sub-types are identified by letter. They are unevenly distributed geographically. Sub-type B is found mostly in the Americas, Japan, Australia, the Caribbean, and Europe. Sub-types A and D are most common in sub-Saharan Africa.

HIV INFECTION CAUSES AIDS

Early in the course of the AIDS epidemic, there was some controversy about whether HIV is the cause of AIDS. Now AIDS experts have demonstrated conclusively that HIV is the cause of AIDS. However, a handful of dissenters ("HIV denialists") continue to claim HIV is not the source of AIDS.

HIV denialists often argue that drug use and other sexually transmitted diseases in people who are "promiscuous" are the cause of AIDS. A few of the arguments and the scientific refutations follow, drawn from reports of a scientific forum on the topic sponsored by the American Foundation for AIDS Research (AmFAR).

Criticisms of HIV as the Cause of AIDS, with Responses

HIV Denialist Argument	Response
Not everyone with HIV develops the symptoms of AIDS.	Development of AIDS in HIV-infected people increases over time. Without treatment, at least 30% of HIV-infected people get AIDS within five years. Over time, increasing percentages of untreated HIV-infected people develop AIDS. The best mathematical models project that over 90% of HIV-infected people will develop serious symptoms within 14 years of infection if they do not receive adequate medical treatment.

Circulating particles of HIV cannot be found in the blood of all AIDS patients.	Earlier in the epidemic, laboratory techniques for culturing HIV were not well-developed, and consequently the virus was often hard to detect in the blood of patients. Now that better laboratory tests exist for establishing the presence of the virus, 90% to 100% of people with AIDS can be shown to have circulating virus.
HIV does not infect enough of the white blood cells called T4 lymphocytes to be fatal.	Although HIV may infect only a minority of the white blood cells called T4 lymphocytes, it damages many more by indirect mechanisms, including suppression of T4 cell growth factor, agglomeration of infected and uninfected T4 cells into dysfunctional giant multinucleated cells (*syncytia)*, and binding of free gp120 to uninfected T4 cells, marking them for destruction and elimination.
Since the body develops a relatively high level of antibodies to HIV, HIV cannot cause serious disease.	A number of viruses provoke production of antibodies that do not neutralize virus inside cells. These viruses include herpes simplex, varicella zoster, hepatitis B, and a number of slow-activating animal viruses. In fact, a number of diseases caused by slow-activating animal viruses resemble HIV disease in their form: long latency, slow damage to the immune system, and killing of white blood cells in culture.

Additionally, we now have the most compelling evidence that HIV causes AIDS: reducing the amount of HIV in the body through antiretroviral treatment can prevent AIDS.

HIV TRANSMISSION

Only Three Routes of Transmission

HIV is known to be transmitted only through:

- Contact of infected blood, semen, or vaginal and cervical secretions with mucous membranes.
- Injection of infected blood or blood products.
- Vertical transmission (that is, from infected mother to fetus) and from mother to infant via breast milk.

Contact of Sexual Fluids or Blood with Mucous Membranes

The virus cannot pass through undamaged skin. HIV can enter the body through the mucous membranes that line the vagina, rectum, urethra, and possibly, on rare occasions, the mouth. Damage to a mucous membrane may increase the risk of transmission of HIV but is not necessary for transmission to occur. Almost all cases of sexually transmitted HIV have been

caused by anal or vaginal intercourse without a condom.

HIV has consistently been isolated in varying concentrations from blood, semen, vaginal and cervical secretions, and breast milk. It has occasionally (and in low levels) been isolated from saliva and tears.[17,18,19] Antibodies to HIV have been detected in urine. Two studies have isolated HIV in pre-ejaculatory fluid.[20,21] Epidemiological evidence implicates only blood, semen, vaginal and cervical secretions, and breast milk as sources of transmission.[22,23] Infection through contact of semen, blood, or vaginal or cervical secretions with mucous membranes occurs during anal or vaginal intercourse and only rarely during oral-genital sex. A component of saliva helps inactivate HIV.[24]

Injection of Infected Blood

HIV can be transmitted by infected blood getting directly into the bloodstream through intravenous, intramuscular, or subcutaneous injection. Blood-to-blood transmission occurs in the following ways:

- Sharing of unsterilized hypodermic needles and syringes.
- Transfusion of contaminated blood and blood products to hemophiliacs and other blood recipients. Since March 1985, the U.S. blood supply has been screened for contaminated blood. The risk of infection from transfusion is now extremely small: risk of becoming infected with HIV from a single transfusion is less than one in two million.[25]

Vertical transmission (Mother to Fetus)

HIV can be transmitted from an infected woman to her fetus during pregnancy and during delivery. This is referred to as vertical or perinatal transmission. Antiretroviral therapy used at the appropriate time in pregnancy significantly reduces the risk of transmission from mother to fetus. Additionally, using certain methods for delivery (such as caesarian section) also helps reduce transmission. Since breast milk can transmit HIV, avoiding breastfeeding further reduces vertical transmission.

No Transmission by Casual Contact

Every major scientific study has concluded that HIV infection cannot be transmitted by casual contact. According to the National Academy of Science, "[o]rdinary standards of personal hygiene that currently prevail are more than adequate for preventing transmission of [HIV] even between persons living within a single household; transmission will not occur as long as one avoids the relatively short list of dangerous sexual and drug-use practices that have been identified."[26] Materials that could theoretically carry the virus in small amounts, such as saliva sprayed in a cough or a sneeze or left on a drinking glass, tears, or urine, have *never* been implicated as the mode of transmission of any case of HIV.[27]

The Public Health Service states "AIDS is a blood-borne, sexually-transmitted disease that is not spread by casual contact… No known risk of transmission to co-workers, clients, or consumers exists from [HIV] infected workers…in offices, schools, factories, or construction sites…"

Workers known to be infected with [HIV] should not be restricted from work solely based on this finding. Moreover they should not be restricted from using telephones, office equipment, toilets, showers, eating facilities, or water fountains."[28]

HIV Is Fragile

HIV is fragile, much more so than the viruses that cause colds or the flu. It is killed by heat, ordinary soap and water, household bleach solutions, alcohol, hydrogen peroxide, Lysol™, and the chlorine used in swimming pools.[29] Bleach kills HIV on contact; soap and alcohol require exposure of a few minutes.

Families of People with AIDS Remain Healthy despite Extensive Household Contact

Many studies have been done on transmission patterns within the families of those with HIV infection and AIDS.[30,31,32] In these studies, no family member or housemate has contracted HIV infection from a person with AIDS other than sexual partners, people who shared needles, and children born to infected mothers. These people lived together without special precautions and shared beds, dishes, clothing, toilets, food, toothbrushes, toys, and baby bottles.

Because there is a theoretical possibility of infection through contact with bloody objects, take routine precautions in case of accidents (avoid exposure to blood) and do not share toothbrushes and razor blades.

HIV Is Not Transmitted by Contact with Inanimate Objects

Some people worry that HIV can be transmitted by fluid left on inanimate objects. This is virtually impossible in everyday situations. In order to observe the survival of HIV on inanimate objects, laboratory studies have looked at how long artificially high concentrations of the virus remain alive. Drying of these HIV samples for several hours reduces the level of virus by 90 to 99%. Since the concentrations in these laboratory samples are vastly greater than those found in blood or other body fluids, the risk of environmental transmission is essentially zero. HIV remains alive in the laboratory only under precisely controlled conditions.[33] Casual contact with inanimate objects has never been implicated as a mode of transmission for HIV.

Other Transmission Concerns

HIV Is Not Transmitted by Insects

The virus is not transmitted by the bites of insects such as ticks or mosquitoes.[34,35] When insects bite a person, they do not inject their own blood or the blood of the last person they bit; rather, they inject their own saliva. Some diseases, such as malaria and yellow fever, are transmitted through the saliva of a species of mosquito. HIV lives only a short time in the body of an insect, cannot reproduce there, and is not present in insect saliva. Even in areas where there are many people infected with HIV and a large population of mosquitoes, there have been no cases of transmission through insects.

Tattooing and Piercing

No cases of HIV transmission through tattooing or body piercing have ever been reported to the CDC. However, because these activities, especially piercing, do pose a theoretical risk for transmission, new or sterilized instruments should be used.

Biting

A handful of cases have been reported in medical literature of the transmission of HIV by biting. These cases involved extensive tissue tearing and the presence of blood. There are more cases of biting by HIV-infected individuals in which HIV was *not* transmitted.

Sweat, saliva, tears

Sweat has not been found to contain HIV. Saliva and tears sometimes contain a low level of virus. No cases of transmission by sweat, saliva, or tears have ever been reported.

2

Observed Patterns of Illness

HIV/AIDS IN THE UNITED STATES

Scientists at the U.S. Centers for Disease Control (CDC) gather information about each case of AIDS reported and identify the probable route of transmission. This surveillance began in 1981. CDC statistics are the primary source for the facts reported below; since it takes time to gather this information, 2007 is the last year about which complete epidemiological data is available.[36,37,38]

CUMULATIVE STATISTICS ABOUT HIV/AIDS IN THE UNITED STATES

- 1,018,428 cases of AIDS were reported from 1981 (the beginning of the epidemic) to December 2007.
- 1,009,219 cases of AIDS occurred in adults and adolescents.
- 9,209 cases of AIDS occurred in children.
- 79.6% of adult AIDS cases occurred in men.
- 19.5% of adult AIDS cases occurred in women.
- Less than 1% of AIDS cases occurred among children 13 years or younger.
- 562,793 people have died from AIDS in the United States.
- AIDS has been reported in all fifty states.

STATISTICS ABOUT HIV/AIDS IN THE UNITED STATES TODAY

- 35,962 new cases of AIDS were reported in 2007; 73% were among men and 27% were among women.
- 455,636 people were estimated to be living with AIDS in 2007.
- 1,106,400 Americans are estimated to be infected with HIV as of the end of 2006. This is equal to approximately 1 in 300 Americans.
- 56,300 adults and children are estimated to have been newly infected with HIV in 2006.

Beginning in 1996, the number of AIDS deaths and new AIDS cases began to decline and has continued to do so. This is largely due to the development and use of effective new antiretroviral treatments.[39]

Incidence and prevalence

In looking at **statistics** about HIV/AIDS, it is useful to understand the meaning of "incidence" and "prevalence." **Incidence** is the *number of new cases* of a disease in a population over a given period of time. **Prevalence** is the *total number of cases* of a disease in a population at a given point in time. Either can be expressed as a proportion of the total, often written as the number of cases per 100,000 of the total population. For example, the estimated incidence of new HIV cases in the United States in 2006 was 56,300, or 23.2 per 100,000 population. The estimated prevalence of HIV infection in the United States at the end of 2006 was 1,106,400, or 447.8 per 100,000 population.

Most CDC data concerns people with AIDS rather than people with HIV infection. Since the median time from infection to AIDS without treatment is ten years, AIDS rates do not accurately reflect current patterns of transmission, especially since effective antiretroviral treatment has slowed the progression of HIV to AIDS. Rates of HIV infection are a more accurate indicator of current trends in infection. However, the data about incidence and prevalence of HIV infection are still limited, as some states and territories only recently began using name-based reporting for HIV. (As of April 2008, all 50 states, the District of Columbia, and five territories use name-based reporting.) Based on information from states that report HIV infection as well as AIDS, the incidence of new AIDS cases is declining but the rate of new HIV diagnoses is remaining stable.

EXPOSURE CATEGORIES OF AIDS CASES

Transmission category	Cumulative[40]	2007[41]
• Men who have sex with men	44%	38%
• Heterosexual contact	14%	20%
• Needle sharing by injecting drug users	23%	12%

• Men who have sex with men and are injecting drug users	7%	4%
• Transfusion of contaminated blood or blood products in the course of medical treatment (including treatment for hemophilia)	1%	0%
• Not **yet** assigned a precise mode of transmission. Generally, further investigation will lead to these cases being reassigned to a specific mode of transmission.	11%	26%

Among children younger than 13, 92% of cases of AIDS cumulatively have been caused by vertical transmission (from a mother with documented HIV infection or at least one risk factor to infant during pregnancy, childbirth, or breast-feeding). Transfusion of blood or blood products caused 4% of infections. Two percent were categorized as not yet reported or identified.

The Center for HIV Information at the University of California-San Francisco has stated that "the AIDS epidemic will neither explode nor diminish as a public health problem in the United States."[42]

Sexual Transmission

Since the beginning of the epidemic, sexual transmission has accounted for at least 73% of all adult/adolescent cases of AIDS. In 2007, it accounted for over 80% of new AIDS cases. Of this group, the underlying HIV infection was transmitted as follows:[43]

	Cumulative	2007
Sexual activity between men	66% (there is an additional 10% of men who had sex with other men *and* shared needles)	57% (there is an additional 6% of men who had sex with other men *and* shared needles)
Sexual activity between men and women	24%	38%

Two cases of transmission from sexual contact between women have been reported in the medical literature. In both these cases, mucous membranes were exposed to blood as well as to vaginal and cervical secretions. [44] As of 2005, the CDC had no confirmed cases of female to female transmission despite the high priority given to investigating cause of transmission in women who initially report their only risk as sex with another woman.[45] This has been supported by a separate study of over one million female blood donors. No cases of HIV infection were reported in women whose only risk was sex with women.

Changing patterns of sexual transmission

The rate of transmission through heterosexual sex increased faster than any other mode of transmission from 1990 to 1995.[46] It declined slowly from 1996 to 1998, increased through 2001, and stabilized through 2007. So far in the United States, many more cases of AIDS have been caused by HIV infection sexually transmitted from men to women than from women to men. This imbalance reflects the fact that in this country there are currently more infected men than infected women; it also demonstrates that HIV is more easily transmitted from the insertive to the receptive partner in intercourse (as is the case with some other sexually transmitted diseases, such as gonorrhea).[47]

Sexually-Transmitted AIDS Among Non-Needle-Sharing Heterosexuals

By December 2007, an estimated 176,157 cases of AIDS were transmitted by sexual contact between men and women.[48] AIDS transmitted by sexual contact between men and women is already epidemic among the sexual partners of needle-sharers. In some communities, heterosexual transmission is also widespread among people who do not share needles.

Non-Sexual Transmission

Transmission Through Needle-Sharing

Thirty-six percent of all people with AIDS were probably infected through needle sharing.[49] Some of these people may actually have been infected through sexual transmission, particularly the 7% of infected needle-sharers who were men who also had had sexual contact with other men.

Injecting drug use has accounted for a steadily increasing proportion of Americans diagnosed with HIV, though this increase may be leveling off. Needle sharing is directly or indirectly responsible for the majority of AIDS among women and children.[50] The prevalence of HIV infection among injecting drug users varies sharply by geographic region, with the highest prevalence in the metropolitan corridor stretching from Boston to Washington D.C., in Miami, and in San Juan, Puerto Rico. Overall, injecting drug use accounted for 12% of estimated new HIV infections in 2006, while new infections among injecting drug users declined 80% between 1988-90 and 2003-06.[51]

Blood and Blood Product Recipients

Transfusion of blood and blood products in the course of medical treatment was the route of transmission in 1% of all cases of AIDS.[52] However, it has been almost eliminated as a source of *new* infections due to screening of the blood supply. Today, the risk of becoming infected with HIV from a single transfusion is less than one in two million.[53] Contaminated blood can escape detection when people donate blood in the first three months of a new infection. During this time, their blood may still test negative on the screening and they will not know they are infected. The use of an antigen test as well as an antibody test to screen blood lowers this risk.

Blood products that are known to have transmitted HIV are whole blood, blood cellular components, plasma, and clotting factors. Blood products that are not known to have ever transmitted HIV are immunoglobulin, albumin, plasma protein fraction, and hepatitis B vaccine. Since the early 1990s, all hepatitis B vaccines are no longer blood products but are genetically engineered material incapable of transmitting HIV.

Vertical Transmission

"Vertical transmission" is the term used to describe HIV transmission from mother to fetus or infant. It is also sometimes referred to as perinatal transmission. HIV infection can be transmitted from mother to fetus during pregnancy, to the infant during delivery, or through infected breast milk.[54] The mother may not have any symptoms; she need only be HIV-infected. Of the 9,209 children under 13 ever diagnosed with AIDS in the United States, 92% have been infected by an HIV-infected mother.[55] There has been a steep decline in vertical HIV transmission since the 1990s primarily because of the use of antiretroviral medication to reduce transmission. A small number of cases of transmission through HIV-infected human breast milk have been reported in the United States. It is recommended that HIV-infected women in the United States (and other areas where safe alternatives to breastfeeding exist) not breastfeed their infants.[56,57]

Without treatment, the pregnancy of an infected woman has a significant chance of resulting in a baby born with HIV infection: studies quote probabilities from 15 to 40%.[58,59,60] Antiretroviral therapy administered to the mother throughout pregnancy, labor, and delivery and then to the infant (with voluntary cesarean section for women with viral loads above 1,000 copies/mL) can reduce the rate of vertical transmission to 2% or less. Antiretrovirals administered only during labor and delivery can reduce the rate to less than 10%.[61] Between 1992 and 1998, AIDS acquired through perinatal transmission declined 75% in the United States.

Fertility of women does not appear to be affected by HIV infection. Pregnancy does not appear to accelerate the course of HIV disease in an HIV-infected woman.

Medical Personnel

Tens of thousands of health care workers treat AIDS patients every day. Health care workers include doctors, nurses, surgeons, dentists, and others. Many health care workers have either accidentally stuck themselves with needles used to treat AIDS patients or have been splashed with blood or other body fluids of patients. The risk of becoming infected through a skin puncture from a needle with blood *known* to be infected is estimated at about 1 in 300.[62] As of

December 2006, there are documented reports of fifty-seven health care workers in the United States who had become infected through their work. Another 140 may possibly have been infected through occupational exposure.

Of the documented cases, 48 were infected through skin punctures, 5 from mucous membrane exposure, 2 from both puncture and mucous membrane exposure, and 2 unidentified. Sixteen laboratory assistants have been infected, 24 nurses, 6 physicians (none of whom were surgeons), 8 in other categories (embalmer, health aide, housekeeper, technician), and no dentists.[63] Health care workers can greatly reduce their risk of infection via exposure to blood by adhering strictly and uniformly to infection-control procedures recommended by the CDC.[64]

There is only one instance reported of a health care worker transmitting the virus to patients. A dentist in Florida apparently infected six of his patients. The circumstances surrounding this are not entirely clear. This is, so far, a unique situation.[65] The CDC has investigated 22,000 patients who had been treated by 63 HIV-infected dentists, surgeons, and physicians and no other cases of transmission from health care worker to patient have been discovered.[66]

Few With Undetermined Risk

Nearly 11% of all cases of AIDS fall into a transmission category which the CDC labels as "other/risk not reported or identified." As of December 2007, 114,224 cases had been reported in this category.[67] Most of these cases are still being investigated.

SOME DEMOGRAPHIC FACTS

Gay Men and AIDS

In 1995, AIDS was the leading cause of death among men between 25 and 44 years of age. Unfortunately, HIV infection had already spread widely among gay men before AIDS was recognized and modes of transmission and prevention were understood. Men who have sex with men continue to account for the largest group of people living with HIV/AIDS. Since the beginning of the epidemic, an estimated 558,937 men who have sex with men (MSM) had been diagnosed with AIDS, 55% of the total number diagnosed.[68] In 2007, in the 34 states and 5 dependent areas with name-based HIV reporting, an estimated 281,885 MSM (253,804 MSM and 28,081 MSM who inject drugs) were living with HIV/AIDS.[69] In 2007, 18,911 AIDS cases were reported among MSM, compared with 8,100 among non-MSM injecting drug users and 11,387 among men and women infected through heterosexual sex.[70] Fortunately, effective treatment has dramatically reduced the number of deaths since 1995.

Risk reduction for HIV infection has been widely adopted in the gay community. The gay community's extraordinary efforts in major urban centers towards risk reduction, public health education, and the support and care of people with AIDS have set an example for community response to the epidemic.

In 2007, MSM accounted for 67% of all HIV infections among male adults and adolescents.[71] The prevalence is disproportionately higher among black men who have sex with men. The rates

of risky behaviors are higher among young MSM than among older MSM.[72]

The CDC states that "studies of sexually transmitted diseases and sexual behaviors suggest a resurgent HIV epidemic among men who have sex with men."[73] The CDC also says "having anal sex without a condom continues to be a significant threat to the health of MSM."[74] Unprotected anal sex (barebacking) with casual partners is an increasing concern. Not all the reasons for an apparent increase in unprotected anal intercourse are known, but research points to the following factors: optimism about improved HIV treatment, substance use, safer sex "fatigue," and seeking sex partners on the Internet.[75]

Sexually transmitted infections increase the risk of transmission of HIV. The rates of syphilis and gonorrhea have increased significantly among men who have sex with men in the last 15 years.[76]

Rates of HIV transmission are alarmingly high among men of color. A CDC study conducted from 2004-2005 in five large cities (Baltimore, Los Angeles, Miami, New York, and San Francisco) found that among gay men, infection rates were 46% in black men, 17% in Hispanic men, and 21% in non-Hispanic white men.[77] The proportion of AIDS cases among white men who have sex with men has declined since 1989, while the rates for all racial/ethnic minorities, particularly black men, have increased. These figures indicate that there is a pressing need for ongoing AIDS education in the gay community, especially among young people and people of color. New strategies must be developed that take into account the difficulty of maintaining risk reduction over a long period of time and the psychological effects of the epidemic on non-HIV-infected gay men.

In locations outside of major urban areas, risk reduction education for gay men remains inadequate. Nationwide, societal hostility to gay men combines with disapproval of sexual activity to hinder safer sex educational efforts. Stigmatization deprives closeted men of the supportive consensus for risk reduction that has developed among openly gay Americans.

Women and AIDS

Women account for over 19% of all adult/adolescent cases of AIDS reported in this country so far. The proportion of cases among women has increased steadily, and by 2007, 27% of newly reported HIV infections occurred among women.[78] In 2007, about 19% of women were infected by needle-sharing and 77% infected through heterosexual contact.[79]

Improved treatment is reaching fewer HIV-infected women than men. Between 1993 and 1996, the number of new AIDS cases fell 60% for men and only 36% for women.[80] In the United States, women with AIDS have a higher rate of mortality than men with AIDS. This likely reflects a difference in access to care and socioeconomic factors such as poverty, homelessness, substance abuse, and domestic violence rather than a biological difference.[81]

HIV/AIDS disproportionately affects women of color. In 2007, women of color accounted for 78% of new cases of HIV among women; black women made up 60% of this total.[82]

Young People and AIDS

At the end of 2003, an estimated 3,135 people ages 13-24 were living with AIDS. In this age group, 47% of men infected acquired HIV through sex with other men. Of the women in this group, 51% were infected through heterosexual sex.[83] In 2007, people age 13-29 accounted for the largest proportion (28%) of new HIV cases.[84] Additionally, data that estimate HIV infection show that even though new AIDS cases are declining among young people (because of more effective treatment), there is no decline in newly diagnosed cases of HIV. African-American youth are the most heavily affected.

Children and AIDS

Children under 13 years of age have accounted for slightly less than 1% of all AIDS cases in the United States. Ninety-two percent of these children were infected by their mothers before or at birth, and another 4% were infected through contaminated blood or blood products.[85]

Hemophiliacs and AIDS

An estimated 15,000 to 20,000 Americans have either hemophilia A or hemophilia B. As of the end of 2007, over 5,500 hemophiliacs have been diagnosed with AIDS.[86] The tragically high prevalence of infection among hemophiliacs is due to the fact that the clotting factor used to treat hemophiliacs is prepared from blood pooled from a very large number of donors. Before screening of donated blood was instituted in March 1985, clotting factor was very likely to be contaminated with HIV. Heat treatment of U.S.-manufactured clotting factor concentrates has eliminated this risk of infection for those hemophiliacs who remain uninfected and those born since 1985.[87]

Race/Ethnicity and AIDS

Race/ethnicity	**Percentage of reported newly diagnosed HIV/AIDS infections by race 2007**[88] (CDC)	**Percentage of the total US population** (Census Bureau year 2000)
Black, not Hispanic	49%	12.1%
White, not Hispanic	28%	69.1%
Hispanic	17%	12.5%
Asian/Pacific Islander	1%	3.7%
American Indian/Alaskan native	less than 1%	0.7%
Unknown race/ethnicity or multiple race/ethnicity	less than 1%	2.4%

This table demonstrates the disproportion of AIDS cases among blacks and Hispanic and the burden these communities bear.

African Americans have accounted for more than 41% of AIDS cases since the beginning of the epidemic in the United States.[89] By the end of 2007, more than 226,000 African Americans had died of AIDS.[90] Nearly two-thirds of the AIDS cases among women and children have occurred in African Americans.[91] In 2006, the rate of infection among African Americans was seven times greater than the rate for whites.[92] Routes of transmission among African-American men living with HIV/AIDS in 2007 were sex between men (51%), needle sharing (21%), heterosexual sex (20%), and both sex with other men and needle sharing (7%); among African American women, routes were heterosexual sex (75%) and needle sharing (24%).[93]

Individuals are not at higher risk for AIDS because of their race or ethnicity. The primary disproportion of AIDS among African-American and Hispanic people occurs in cases that were transmitted by needle sharing or the infected sexual partners and children of needle sharers. The high incidence of risk behavior, including needle-sharing, in some African-American and Hispanic communities is probably due to the combined impact of underlying social and economic factors, including poverty, racism, homophobia, unequal schooling, and unequal opportunity for employment. Further, African-American and Hispanic communities are concentrated in the large urban areas, which have a higher prevalence of HIV infection.

The spread of HIV infection among African-American and Hispanic needle-sharers has continued essentially unchecked: AIDS education has often been targeted toward a white middle-class population and has not adequately addressed the issues relevant to those needle-sharers who generally have more limited access to information and medical services. There is a severe shortage of treatment facilities for people who wish to stop using drugs.

White people with AIDS have a life expectancy from time of diagnosis that is two to three times longer than that for African-American people with AIDS. This is due to social factors (poor health care, delayed diagnosis of HIV, drug-related problems, nutritional status) rather than biological differences.

AIDS INTERNATIONALLY

The toll of HIV disease worldwide is enormous. As of 2007, there are an estimated 33.2 million people worldwide living with HIV/AIDS and at least 21.8 million who have died of AIDS. There were 2.5 million new HIV infections and 2.1 million deaths from AIDS in 2007.[94]

About 95% of HIV infected people infected with HIV live in developing countries where the ravages of the disease are compounded by the effects of poverty. AIDS is the leading cause of death in sub-Saharan Africa and the fourth leading cause of death worldwide.

Figures showing the number of people who are HIV-infected or have AIDS are estimates. Many countries lack the resources to gather accurate data. Epidemiologists use small studies and a variety of statistical models to make estimates. “

Following are global AIDS estimates provided by the United Nations Joint Programme on HIV/AIDS and the World Health Organization:[95,96]

Region	Number of people living with HIV/AIDS as of 2007	Adult prevalence rate
Sub-Saharan Africa	22 million	5.0%
South and South-East Asia	4.2 million	0.3%
East Asia	740,000	0.1%
Latin America	1.7 million	0.5%
North America	1.2 million	0.6%
Western and Central Europe	730,000	0.3%
Eastern Europe and Central Asia	1.5 million	0.8%
Caribbean	230,000	1.1%
North Africa and the Middle East	380,000	0.3%
Oceania	74,000	0.4%

In general, the percentage of the world's adult population living with HIV (known as HIV prevalence) has been leveling off, and is declining in sub-Saharan Africa, though the total number of infections is increasing.[97]

Sub- Saharan Africa

The AIDS epidemic is most severe in sub-Saharan Africa, where 22 million of the world's 33.2 million people with HIV/AIDS live. The rates of HIV infection (number of infected people per 100) are worst in southern Africa:

- Botswana 24.1%
- Swaziland 33.4%
- Lesotho 23.2%
- Zimbabwe 20.1%
- Zambia 17.0%
- South Africa 18.8%
- Malawi 14.1%
- Mozambique 16.1%
- Central African Republic 10.7%.

In order to grasp the magnitude of the AIDS epidemic in sub-Saharan Africa, consider the following facts[98,99]:

- AIDS is the leading cause of death in sub-Saharan Africa.
- Just over 10% of the world's population lives in sub-Saharan Africa; 76% of AIDS deaths in 2007 occurred in this region.
- In 1998, 200,000 people died from wars in sub-Saharan Africa and 2 million died of AIDS. In 2007, 1,600,000 people in sub-Saharan Africa died of AIDS.
- The average life expectancy in sub-Saharan Africa has dropped from 62 years to 51 years due to HIV. In Swaziland, the life expectancy has dropped to below 40 years.
- A 15-year old boy in Botswana has an 85% chance of eventually dying of AIDS.

Countries in sub-Saharan Africa are affected by the AIDS epidemic in diverse ways. Economies and infrastructures are being undermined, agriculture devastated, family structures destroyed, and health and education systems ravaged. So far, AIDS in southern Africa has left over 12 million orphans who have lost their mothers or both parents; these children are increasingly subject to illness, malnutrition, abuse, and sexual exploitation.[100] In the future there will be a "missing generation" of adults capable of caring for children and old people and maintain the economy and the society.

Prevention programs are limited and medical treatment that might reduce suffering and limit mother-infant transmission is usually not available. Dr. Peter Piot, former Executive Director of UNAIDS, stated that sub-Saharan Africa alone needs a minimum of $3 billion a year to turn back the tide of the epidemic and only a tenth of that is available.

Both Zimbabwe and Uganda have waged successful prevention campaigns and rates of infection in these countries, though still very high, have decreased. However, there is concern the epidemic in Uganda may begin to grow again. South Africa has made recent changes in policy, which have already shown promising results in reducing perinatal transmission.

South, East, and Southeast Asia

In South, East, and Southeast Asia about 4.9 million people are currently living with HIV. Four hundred thirty-two thousand people were estimated to have been newly infected in 2007. About 302,000 people are believed to have died of AIDS in 2007.[101] The rates of infection remain relatively low at the present time; only three countries, Cambodia, Thailand, and Myanmar, have a prevalence rate above 1% among those 15 to 49. However, this statistic is misleading. The huge populations in several Asian countries mean that even with low prevalence rates, the number of people infected is enormous; China and India together account for nearly 37% of the world's population. In India, where the infection rate is less than 1%, an estimated 2.5 million people were living with HIV in 2006, a number second only to South Africa. The official estimate is that 700,000 people living in China are currently HIV-infected. Given poverty, lack of prevention measures, and limited medical care, this sets the stage in South and Southeast Asia and perhaps China for a repetition of the disaster occurring in Africa.[102]

The Caribbean

The HIV epidemic is severe in several Caribbean Island nations, where it is estimated that 230,000 people are living with HIV/AIDS. In Haiti, 3.8 of every 100 adults are infected; in the Bahamas, 3.3 in 100; in Trinidad and Tobago, 2.6 in 100; and in the Dominican Republic, 1.1 in 100. Sex between men and women was the primary source of transmission in most of these countries. Saint Lucia, the Cayman Islands, and the British Virgin Islands are relatively unaffected.

Latin America

In Latin America, there are an estimated 1.7 million HIV-infected people. The HIV epidemic in Latin America varies from country to country. Countries along the Caribbean coast (Guyana, Suriname, Honduras, Guatemala, and Belize) have the highest prevalence rates. In these countries, most transmission occurs through heterosexual sex. The Andean countries currently have the lowest rate of HIV infection in Latin America.

In Mexico, Argentina, Colombia, Costa Rica transmission occurs primarily through needle sharing and sex between men. Brazil has an epidemic in both heterosexual transmission and transmission in men who have sex with men.

Eastern Europe and Central Asia

By the mid-2000s, the HIV epidemic had grown fastest in Eastern Europe and Central Asia, though the rate of new infections has decreased. There were 150,000 new cases of HIV in this area in 2007, bringing the total number of HIV-infected people to 1.5 million, a 150% increase

since 2001. Injection drug use has been driving the HIV epidemic in this part of the world.[103]

Nearly 90% of newly reported HIV infections were in either the Russian Federation (66% of new cases and 940,000 people living with HIV in 2005) or Ukraine (21% of new cases and 410,000 people living with HIV in 2005).[104] The epidemic is also growing in all the Central Asian Republics.[105] While the epidemic has stabilized in the Baltic states of Estonia, Latvia, and Lithuania, Estonia has the highest rate of new diagnoses and the highest adult prevalence rate in Europe.[106]

Western Europe, Canada, Australia, and New Zealand

The pattern of the epidemic in Western Europe is similar to that of the US. In 2007, there were 730,000 people with HIV in western and central Europe, 19,400 in Australia and New Zealand, and 73,000 people with HIV in Canada. In these countries, the rate of infection has declined in the last five years. Most transmission has resulted from needle sharing and sex between men although, as in the US, the epidemic has become more heterosexual over time. Treatment is generally widely available, as the countries of these regions are economically developed.

The Middle East and North Africa

It is estimated that 380,000 people are living with HIV in this region. About 25,000 people died of AIDS in 2007 and 35,000 people became newly HIV-infected. The adult prevalence of HIV is low (<0.1%) in all of these countries except Sudan, where the HIV prevalence is estimated to be 1.6%. However, it is extremely difficult to collect accurate data in this area of the world.

3

Prevention and Risk Reduction

Learning to distinguish situations in which there is a real possibility of HIV transmission from situations with little or no risk of transmission will reduce your risk of becoming infected. In common, everyday non-sexual activities, you do not need to take special precautions. In certain sexual activities and in use of needles for injecting drugs, you can take steps to reduce the risk of transmission of HIV.

NO DANGER FROM CASUAL CONTACT

There is no danger of contracting HIV through casual contact. You should, however, observe routine and reasonable precautions against accidental contact with blood, semen, or vaginal secretions. Wash hands or skin with soap and water. Clean surfaces where blood or semen has been spilled with soap and water or a mild disinfectant solution, such as 10% household bleach. Do not share toothbrushes, razors, tweezers, or other instruments that might carry fresh blood. These precautions also provide protection against many common illnesses.

Service Occupations No Hazard

The U.S. Public Health Service (PHS) has made a series of recommendations regarding HIV infection in the workplace. These recommendations explicitly say that transmission of HIV is unlikely even in work settings in which close non-sexual person-to-person contact occurs. These occupations include:

- Food service workers, including cooks, waiters, bartenders, and airline attendants.
- Personal-service workers, including hairdressers, barbers, cosmetologists, and manicurists.
- Health care workers, including nurses, doctors, dentists, optometrists, lab technicians, and emergency medical technicians.

The PHS states: "All laboratory and epidemiological evidence indicates that blood-borne and sexually transmitted infections are not transmitted during the preparation or serving of food or beverages and no instances of [HIV] transmission have been documented in this setting."[107]

The PHS found no evidence of transmission of HIV from personal-service workers to clients or vice versa.

Health care workers known to be infected with HIV need not be restricted from work. Since blood is often present during medical procedures and is a source of transmission of HIV, the PHS has outlined routine hygiene procedures to prevent the transmission of HIV in a health care setting.[108]

No Risk of Casual Transmission from Child to Child

Since the start of the AIDS epidemic, there has been public and media concern about the possibility that young children with AIDS might somehow infect their schoolmates in ordinary day-to-day interactions. In some cases, fearful parents have harassed sick children and attempted to have them removed from school. Such fear is not warranted by scientific evidence. No case of HIV transmission has been documented in a school or day-care setting.

Due to sexual activity and injecting drug use, adolescents face a much greater risk for becoming HIV-infected than younger children.

Blood Transfusion Much Safer Since 1985

The blood supply in the United States has been tested for HIV since 1985, and the risk of infection through blood transfusion is close to zero (under one in two million).[109] People who were transfused with many units of blood in the few years prior to late spring 1985—after HIV was present in the population and before testing of blood for HIV began—were at increased risk of becoming HIV-infected, especially if these transfusions occurred in areas with a high incidence of HIV infection (New York, San Francisco, and Los Angeles).[110]

Giving Blood Has Always Been Safe

There is absolutely no risk of becoming infected with HIV from donating blood, and there never has been, since the needles used to draw blood are sterile-packaged and never re-used. Currently, according to American Red Cross policy, any man who has had sex with another man since 1977 cannot donate blood. This policy is controversial and may be changed. Many feel that it is discriminatory and needlessly reduces blood available for transfusion, which is often in short supply. If you are at risk of becoming HIV-infected and you are pressured into participating in a blood donation drive, be sure to indicate on the form provided that you wish to donate your blood for *research purposes only.* This option is standard and is provided by blood banks to protect your privacy while helping you avoid any embarrassment associated with refusing to donate blood.

AVOID NEEDLE-SHARING

You face high risk for HIV infection if you share needles, whether to inject or "skin-pop" heroin, cocaine, speed, or any other drug. If you are already infected, drugs may increase the chance that your infection will make you ill. HIV-infected injecting drug users who continue to shoot drugs have a worse course of illness than those who stop using drugs.[111]

Cleaning needles

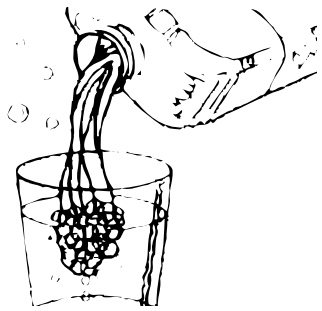
If you continue to inject drugs, it is crucially important that you do not share IV drug equipment ("works," "gimmicks," "sets"), including syringes, rubber bulbs, needles ("points"), "cookers," or cotton. If you buy new works, clean them *before* using them. If you share works, clean them before you or the next person uses them. Blood may be in your works even if you can't see it. Clean your works either with rubbing alcohol (available in drug stores), a household bleach solution (3 tablespoons of bleach in a cup of water), or boiling water. To clean your works:

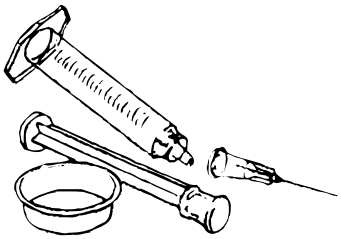
- Pour the alcohol, bleach solution, or boiling water into a clean glass.
- Pull liquid up into the syringe, shake well, and then squirt the liquid out again. Repeat this several times.
- Take your works apart, separating the plunger and needle from the syringe.
- Let them soak in the alcohol, bleach solution, or boiling water for 10 to 15 minutes.
- Rinse the parts of your works well under running tap water.
- Put your works back together. Pull clean water up into the syringe, then squirt it out again. Repeat a few times.

If you cannot wait, use the bleach solution, skip the soaking step, and be sure to rinse thoroughly with water.

Remember: You face a high risk for HIV infection if you have shared needles, whether to inject or "skin-pop" heroin, cocaine, speed, or any other drug. And, no matter how you got infected, you can still pass it on through sex.

NEEDLE CLEANING (SEE TEXT)

1. POUR	2. SQUIRT
	

3. SEPARATE	4. SOAK (THEN RINSE)
	

Remember: no matter how you got infected, you can still pass on HIV through certain sexual activities.

Social and political issues in needle-sharing transmission

Drug users share needles primarily because they cannot gain access to or afford new needles and syringes. Most states have laws against possession of needles and syringes for "illicit" drugs. Injecting drug users often do not carry needles or syringes because of fear of police attention or arrest. These practices increase the sharing of needles.

Many cities in the US and around the world have started needle exchange programs (NEPs). These programs distribute clean needles, safely dispose of used ones, and provide HIV counseling and referrals to drug treatment programs. Eight federally funded reports have summarized extensive studies of these programs. Each report has concluded that needle exchange programs reduce HIV transmission significantly.[112] These studies demonstrate that needle exchange programs do not increase the use of drugs among injecting drug users or others. In fact, they probably encourage users to seek treatment for their drug problem.

Despite this, the US federal government has restricting funding for needle exchange programs since 1988, leaving the burden to individual states and cities. In July 2009, the US Congress partially lifted this restriction but barred federally financed programs from operating within 1000 feet of schools, colleges, and a number of other sites. This limitation will make it impossible for federally funded needle exchange programs to operate in high population urban centers. In addition, a Congressional rider on the Washington, DC budget will limit the use of local tax funds for these programs; Washington is an epicenter of the US AIDS epidemic.

REDUCE SEXUAL RISK

It is never too late to begin protecting yourself against HIV. Even if you have reason to believe you have already been infected, it is always to your benefit to follow sexual risk reduction guidelines since repeat exposure to HIV or exposure to other sexually transmitted infections may help to trigger illness. Follow the risk reduction guidelines below in any future sexual encounter.

Sexual Risk-Reduction Guidelines

The most important part of sexual risk reduction can be summarized in one sentence:

USE A CONDOM FOR EVERY EPISODE OF INTERCOURSE, BOTH VAGINAL AND ANAL.

If you follow this one guideline and use condoms correctly, the likelihood of HIV transmission is extremely low, even if your other sexual practices have some small risk of HIV transmission.

Understanding Sexual Transmission

HIV transmission can occur when infected fluid comes in contact with mucous membranes (the lining of the vagina, rectum, urethra, and, rarely, mouth). However, several variables must be considered in order to assess the possibility of transmission.

- Not all mucous membranes are equally susceptible to infection with HIV. The lining of the rectum, vagina, and urethra are more susceptible than the lining of the mouth because they are composed of different types of cells.[113] The lining of the rectum is more fragile than the lining of the vagina and therefore more susceptible to small cuts and tears, which increase the risk of transmission.

- Not all body fluids contain equal amounts of HIV. Blood and semen generally contain the highest amount of HIV, cervical secretions contain less, and vaginal secretions still less. Pre-ejaculatory fluid contains a significantly lower level of virus. HIV can only rarely be isolated in saliva and then at low levels; an enzyme contained in saliva seems to partially inactivate the virus.

- The amount of body fluid present during a particular sexual act is a factor. For example, pre-ejaculatory fluids are usually produced in smaller amounts than semen. (Pre-ejaculatory fluid is a viscous, clear fluid that is secreted from the penis some time prior to the ejaculation of semen itself).

- The extent of mucous membrane exposed to infected fluid plays a role in the likelihood of transmission. During intercourse, the lining of a man's urethra comes in contact with less fluid than the vagina or rectum since fluid must reach the urethra through the hole at the tip of the penis.

Practicing Sexual Risk Reduction

Receptive anal or vaginal intercourse

The receptive partner in vaginal or anal intercourse without a condom is at highest risk of becoming infected with HIV if his or her partner is infected. Semen, a body fluid with a potentially high level of HIV, is in contact with the lining of the rectum or the vagina, a relatively large area of susceptible mucous membrane. The lining of the rectum is somewhat more fragile than the lining of the vagina and may more easily develop small tears or

abrasions that increase the possibility of transmission.

Condoms can essentially eliminate the risk of transmission because they prevent infected semen from coming in contact with the rectum or vagina. Use of a water-soluble lubricant (like K-Y) reduces latex condom breakage. Never use an oil-based lubricant (like hand lotion or Vaseline) with latex condoms; oil-based lubricants can be used with polyurethane condoms, including the female condom. If a condom breaks or leaks and ejaculation occurs and semen escapes, there is a risk of infection. You can further reduce the risk of infection if the penis is withdrawn before ejaculation.

Insertive anal or vaginal intercourse

The insertive partner in vaginal or anal intercourse is at risk of infection, though the risk is lower than that of the receptive partner. During vaginal intercourse, the lining of the man's urethra (a relatively small area) comes in contact with vaginal and cervical secretions and possibly with blood. In anal intercourse the lining of the urethra may come in contact with blood, which is often present in the rectum. Infection of the insertive partner in both anal and vaginal intercourse has occurred frequently, though less often than infection of the receptive partner. Condoms essentially eliminate this risk.

Fellatio

Fellatio (sucking, blow job) is stimulation of the penis with the mouth. It is a rare source of sexual transmission and the risk of transmission from fellatio is very much lower than the risk of unprotected intercourse. There is controversy about the level of safety of fellatio to the receptive partner (the person in whose mouth the penis is placed). Based on currently available information, it is a reasonable conclusion that transmission to the receptive partner by fellatio can occur but is rare.

There is only a theoretical risk to the insertive partner (the person putting his penis in the other person's mouth). No cases of transmission to the insertive partner in fellatio have been reported.

Reducing risk with fellatio

- Avoid ejaculation in the mouth. Since semen may contain a relatively high concentration of virus, it is wisest to avoid contact of semen with the lining of the mouth.[114] The risk of infection to the receptive partner is considerably lower if the penis is withdrawn before ejaculation.

- Do not engage in receptive fellatio if you have cuts or sores in the mouth or on the tongue, have just been to the dentist for cleaning or a surgical procedure, or if you have a sore throat. Do not floss or brush your teeth immediately before performing fellatio. Cuts, sores, and irritation of the lining of the mouth make it easier for infected semen to enter the body. If you have an infection in your throat, white blood cells will be present, and they are good "targets" for HIV.

- If you want to make fellatio essentially risk-free, cover the penis with a condom. Use of a

condom during oral sex essentially eliminates risk.

Evidence about the possibility of transmission of HIV through fellatio

- Biological evidence

  The mouth is not an efficient site for transmission, both because of the element in saliva that tends to inactivate HIV and the type of mucous membrane in the lining of the mouth.

  Further, if fellatio is not continued to ejaculation, the mucous membranes of the mouth are not exposed to semen. This probably lowers the risk of infection significantly. Two small studies have shown that pre-ejaculatory fluid ("pre-cum") sometimes contains virus but at much lower levels than semen. (Pre-ejaculatory fluid is a viscous, clear fluid that is secreted from the penis some time prior to the ejaculation of semen itself).

- Clinical evidence

  Many reliable clinicians have reported cases of patients who became infected through fellatio.[115] Although some researchers question the reliability of the patients' reports, the physicians reporting these cases had thoroughly interviewed the patients and were themselves convinced of the accuracy of the report.

- Epidemiological studies

  Several epidemiological studies have assessed the increased likelihood of infection of people who have unprotected fellatio. These studies are difficult to evaluate. Generally, if someone reports that s/he had intercourse without condoms *and* fellatio without condoms, the case is attributed to transmission through intercourse. It is possible that some of these cases actually were infection related to fellatio. This is referred to as the "masking effect."

  Studies attempting to assess the relative danger of oral sex for HIV transmission have had conflicting results.[116],[117],[118] Increased concern has been voiced by some recently because a carefully done study showed that 8 men in a cohort of 102 men who had sex with men infected with HIV - that is, 7.8% - were apparently infected through fellatio.[119] (The principal researcher of this study believes that this is a higher percentage than would normally occur because men who volunteered for the study were already likely to be very careful about using condoms for intercourse and thus have a comparatively low risk of infection by this route.[120]) Three of the eight men reported oral problems including bleeding gums. Ejaculation in the mouth occurred in seven cases, and all eight involved either a large quantity of pre-ejaculatory fluid or ejaculate.

Cunnilingus

Cunnilingus is stimulation of a woman's genitals with the lips and tongue. Cunnilingus during menstruation is possibly risky for the person performing cunnilingus because there may be a high concentration of virus in menstrual blood, even though the mouth is not an efficient site for transmission. If menstruation is not occurring, the mucous membranes of the mouth are not exposed to blood. This lowers the risk of infection during cunnilingus considerably. However,

vaginal and cervical secretions sometimes contain a low concentration of virus. A few cases of transmission by oral-vaginal contact have been reported, although only when blood was present. There appears to be virtually no risk to the person whose genitals are being stimulated.

The small risk associated with cunnilingus is further lowered if an effective barrier, such as a square of latex or plastic wrap (called an "oral dam" or "dental dam"), is used to separate the genitals from the partner's lips and tongue. Although plastic wrap has never been formally tested, it is theoretically thick enough to prevent transmission. Do not use the microwavable type, as this has small holes in it. An oral barrier can also be made from a condom: cut off the closed end of a condom, cut from bottom to top vertically, and unroll the condom into a square piece of latex that can be used as a barrier.

Oral-anal contact

Oral-anal contact (rimming) is stimulation of the anus with the lips and tongue. The possible risk is for the partner performing the oral-anal contact. This is not a likely route of transmission of HIV, although it is possible that blood present in the rectum may come in contact with the lining of the mouth. However, oral-anal contact is a likely way to transmit intestinal parasites, which can produce troublesome medical problems. The risk of transmitting parasites associated with oral-anal contact is made much lower if an effective barrier is used to keep the lips and tongue from coming into contact with the partner's anus. The person receiving stimulation to the anus is essentially at no risk.

Deep Kissing (French Kissing, Tongue Kissing)

Kissing is not risky because HIV is either not present or present at very low levels in saliva. There is no evidence that exchange of saliva transmits the virus, even in prolonged deep kissing. The CDC has reported only one case of possible transmission by kissing. In this instance, the infected man had frequent bleeding of the gums and sores in his mouth. His partner had periodontal disease.[121]

Touching Genitals with Fingers

Touching or rubbing a partner's genitals with fingers or insertion of fingers in the vagina or anus (fingering) does not present a risk of transmission unless the fingers have deep open cuts or sores.

Activities involving no contact with body fluid

If there is no contact between one partner's bodily fluids and the other partner's mucous membranes, there is *no risk* of infection—transmission of HIV cannot occur. The cells of skin are different from the cells of mucous membranes. Contact of HIV-infected fluid with intact skin does not transmit HIV. A large, recent open cut in contact with infected fluid is usually necessary for transmission to occur. Sexual activities, such as mutual masturbation, rubbing bodies, and kissing skin, are therefore completely safe even if one or both partners are infected.

Probability of Sexual Transmission from a Single Contact

With HIV, a single act of anal or vaginal intercourse without the use of condoms may be sufficient for transmission. However, in the vast majority of cases, it appears that repeated exposure to the virus through multiple acts of intercourse has been necessary for transmission to take place.[122]

Estimates of probability of infection when one partner is HIV-infected [123,124,125,126]

Activity	Range of Risk
Single act of anal intercourse to the receptive partner	0.0082 (82 in 10,000)
Single act of anal intercourse to the insertive partner	0.0006 (6 in 10,000)
Single act of vaginal intercourse to the woman	0.0005 to 0.0009 (5 in 10,000 to 9 in 10,000)
Single act of vaginal intercourse to the man	0.0001 to 0.0003 (1 in 10,000 to 3 in 10,000)
Single act of fellatio to the receptive partner	0.0006 (6 in 10,000)

Note: Studies in developing countries estimate probabilities of infection through vaginal intercourse to be greater by a factor of 10 for both men and women, likely secondary to greater prevalence of other sexually transmitted infections and limited treatment availability.

Non-behavioral factors that may affect transmission

In studies of people whose only risk was repeated intercourse without condoms with HIV-infected partners of the opposite sex, the prevalence of HIV infection ranged from under 10% to as high as 60%.[127] These studies raise the question of why some sexual partners of infected people become infected while others do not, even when the sexual behavior is the same. Several factors may affect this:[128,129]

- Some people may be more resistant to the virus than others. This is probably based on the absence or reduced susceptibility of certain cells that are attractive targets for the virus in the mucous membranes of some people. It is also possible that people may vary in the immune mechanisms that make them able to mount resistance to the virus.

- HIV is more easily transmissible when the level of virus in the body is higher. Viral load is high shortly after infection and in late stages of the disease as the immune

system deteriorates. Consequently, infected people probably transmit the virus more easily at these times. Treatment with antiretrovirals, which lower the level of virus in the body, may also diminish infectiousness; however, it is still possible to transmit HIV even with a very low level of virus.

- Genital ulcers caused by concurrent infection with any organism in either partner make transmission of HIV more likely.[130] Mucous membranes in the vagina, rectum, and urethra are more vulnerable to infection from infected fluids if sores or other lesions caused by other sexually transmitted diseases are present. Also, activation of the immune system by other STIs can make the body more susceptible to HIV. Studies have clearly demonstrated that people are 2 to 5 times more likely to become infected with HIV when other sexually transmitted diseases are present.[131]

Condom Information

Condoms can prevent the transmission of HIV and also provide significant protection against infections such as gonorrhea, chlamydia, HPV (human papillomavirus), syphilis, and herpes.[132],[133] Other methods of birth control, such as a diaphragm with spermicide, do not provide adequate protection against the transmission of HIV infection or other sexually transmitted infections. Condoms can be bought at drugstores (no prescription is needed). For people at Columbia, free condoms are also available at Health Services. Some highly infectious organisms, such as chlamydia and HPV (but not HIV), can probably be transmitted by the hands during foreplay, as well.

Latex and polyurethane condoms have been shown in the laboratory to block transmission of HIV, as well as CMV, chlamydia, gonorrhea, and, in many instances, herpes.[134] In a study of 245 heterosexual couples where one partner was infected with HIV, none of the 123 uninfected people in couples consistently using condoms became infected, while 12 of the 122 partners who didn't use condoms became infected.[135]

Use Condoms Correctly

- Condoms are latex, polyurethane, or animal-membrane sheaths that fit over the erect penis and act as a barrier to prevent semen or pre-cum from escaping while the penis is inside the vagina or rectum. Use only latex or polyurethane condoms. Do not use animal membrane condoms: they contain pores through which HIV can pass.[136] Polyurethane condoms became available in 1995. While there is less data regarding their safety in practice (reducing transmission of sexually transmitted infections and pregnancy), there is evidence that the material they are made of is even less porous than latex. Consequently, they should prove to be at least as safe as latex condoms. The advantage of polyurethane condoms is that they can be use with oil-based lubricants (such as Vaseline and baby oil), are thinner than latex condoms, and transmit heat better. This means that polyurethane condoms feel more "natural" to some people. The disadvantage of polyurethane condoms is that they are more expensive. They may be particularly useful to people who are allergic to latex.

- Do not use condoms that are ribbed or textured to increase stimulation since these condoms may cause damage to genital tissues that, while unnoticeable, may make infection more likely if breakage occurs. However, ribbed condoms provide more protection than not using condoms at all.

- Store condoms in a cool, dry place out of direct sunlight. Condoms kept in wallets may become damaged after a period of time. Condoms are considered to be good for two years after their date of manufacture, which is sometimes printed on the package.

- The condom should be put on the penis after it is erect, not before. Put on the condom before the penis comes in contact with the genitals or anus.

- Condoms come packaged either rolled-up (usually) or loose. If the condom is rolled-up, determine which side is the inside of the condom, place that side against the tip of the penis and roll the rest of the condom down to the base. The condom should fit snugly so that it does not slip off during intercourse. If the condom is packaged unrolled, draw it over the penis like a glove.

- When putting on a condom, pinch about one-half inch of the condom's tip to leave a small air-free space — this will help keep semen from bursting the condom upon ejaculation. If the penis is uncircumcised, retract the foreskin before putting on the condom. Putting a small amount (one drop) of lubricant inside the condom may increase comfort, though too much lubricant inside the condom may lead it to slip off during intercourse.

- If intercourse is continued to ejaculation, the penis should be withdrawn promptly afterwards. Since condoms may break or leak, ejaculation inside the body presents an increased risk of infection.

- In any case, the condom-covered penis should be withdrawn from the vagina or rectum before the penis becomes soft. During withdrawal, hold the rim of the condom firmly against the penis so that the condom cannot slip off and no semen can escape.

- Do not re-use condoms.

In 1994, so-called "female condoms" became commercially available. Studies indicate that female condoms are effective in preventing transmission of HIV.[137,138] The technical name of these devices is lubricated polyurethane bags. These are polyurethane devices that are inserted into the vagina or rectum in order to create a protective barrier and prevent contact of semen with the mucous membrane of the vagina or rectum. The advantages of these condoms are that the receptive partner has more control over their use and that they can be inserted many hours before sex. Their disadvantage is that they are expensive and some people find them uncomfortable or aesthetically displeasing.[139] Female condoms are also available at Health Services at Columbia free of charge.

Lubricants Should Be Water-Based

Lubrication is important to avoid tearing the condom or abrading body tissue. With latex condoms, always use water-based lubricants (such as *K-Y Jelly*, *Foreplay, Probe,* and *Wet*). These lubricants contain either glycerin or silicone. Never use oil-based lubricants (such as hand-lotion, *Vaseline, Crisco,* baby oil, vegetable oil, mineral oil, suntan lotion, *Albolene, Elbow Grease, Lube,* or *Shaft*) since these may damage the latex of the condom. (Oil-based lubricants can be used with polyurethane condoms.) Use a generous amount of lubricant on the outside of the condom.

Do not use condoms or lubricants containing Nonoxynol-9

A spermicide called nonoxynol-9 is found in some contraceptive jellies and creams as well as in many lubricants and on some condoms. For some time, it was believed that preparations that contain nonoxynol-9 provided extra protection when used with condoms since nonoxynol-9 has been shown to kill HIV in laboratory settings.[140] However, a large double-blind placebo study of the effect of nonoxynol-9 on HIV transmission was conducted by UNAIDS from 1996 to 2000. The study volunteers were female African commercial sex workers. The women using a nonoxynol-9 gel became infected with HIV at a 50% higher rate than women using a placebo gel. This may be due to the nonoxynol-9 gel irritating vaginal tissues and making them more susceptible to HIV.

At the present time, the CDC recommends against the use of nonoxynol-9. Some condoms are lubricated with a substance containing nonoxynol-9. It is preferable to use lubricated condoms without nonoxynol-9. However, nonoxynol-9 condoms contain a far lower concentration of nonoxynol-9 than the gel used in the study, and it is safer to use these condoms than to use no condom.[141]

Additional Guidelines

It is preferable not to share sex toys (dildos, vibrators, etc.). If shared, clean sex toys thoroughly with soap and water and/or cover with a condom.

Wash the genitals with soap and water after sex. Douching or enemas immediately before or after sex do not help protect you against infection and may even increase the risk of infection by damaging natural protective barriers of the vagina or rectum.[142] Do not put chemicals not intended for internal use into your vagina or rectum.

If you have sores or abrasions on your genitals, anus, or mouth, or you have another sexually transmitted infection, avoid activity that brings these areas into contact with your sexual partners. The presence of any one of a variety of sexually transmitted infections increases the risk of transmission of HIV infection.[143]

Adapting to Risk Reduction

Of course, the greater the chance that your partner is infected, the greater the risk of infection through sex. Men who have had unprotected sex with other men and people who have shared needles for injection drug use are statistically at greatest risk of being infected in the United States, but most sexually active people are at some risk for HIV infection. It is extremely difficult to accurately assess a partner's risk of being HIV-infected. Intuition is an unreliable guide. You cannot tell whether a sexual partner is infected from appearance or social behavior. If you do not know a partner well, then you cannot know the level of risk.

Simply limiting the number of your sexual partners is not sufficient precaution against HIV infection. Two related misconceptions date from the early stages of the epidemic in this country: first, that having had many sexual partners somehow in and of itself causes AIDS; and second, that if you have had a small number of sexual partners, you are not at risk for AIDS. A recent study of a cohort of men who have sex with men indicated that 46% of men younger than 33 were infected by a steady partner. [144]

Even if you have only one sexual partner, that person may be infected. Repeated unsafe sexual contact with one infected partner presents a high risk of infection.

The more partners you have, the greater the odds are that at least one of your partners will be infected. However, if you consistently avoid all high-risk sexual activity with all your partners, the extra risk associated with multiple sexual partners becomes much less significant.

Strike a Balance

Some people become so afraid of HIV infection that they give up sex, or alternate abstinence with occasional impulsive episodes of high-risk sex. Others deny that the epidemic has any chance of affecting them and continue high-risk sexual behavior without an appropriate level of concern. Extremes of behavior (anxious and fragile abstinence, unconcerned high-risk sex) may lead to a high risk of infection. A middle course usually represents a better strategy. You need not give up your sex life, nor should you expose yourself to high-risk sexual activity.

Many people follow risk reduction guidelines and still enjoy sex that is both safe and satisfying. Risk reduction usually requires some loss of spontaneity and can be challenging to maintain over a long period of time. It is more productive to view your own or others' lapses from risk reduction with sympathetic concern and understanding than with condemnation. If you consistently engage in sexual activity that you feel places you at an unacceptably high risk of transmission, seek help from an AIDS organization or a counselor who understands the psychological difficulty of risk reduction. At Columbia, we urge you to call GHAP at 212.854.6655 to speak with a counselor expert in this area.

Planning for Risk Reduction

Learn how to come to an agreement with your partner about the sexual activity you will have together. Think through the issues in advance. This will help you avoid impulsive decisions and give a clear and consistent message to your partner. Have condoms available if you plan to have

intercourse. Women hesitant to purchase and carry condoms should be aware that women now buy half of all condoms sold. The use of alcohol or other recreational drugs often impairs judgment; use of crystal methamphetamine has been strongly correlated with increased sexual risk and HIV infection. Do not make decisions about sexual activity while you are intoxicated. For more information about alcohol use, see the alcohol section in chapter 6.

Try to talk about risk reduction with your partners before sexual excitement interferes. Many have found that prospective partners interpret raising the subject of risk reduction well before sex as a sign of intelligence and prudence. Others prefer to wait until they are actually involved in explicit sexual activity; follow this course of action only if you can stick to your decisions about risk reduction and if you know that your partner will respect your wishes.

Ask yourself the following questions:

- Have you been practicing risk reduction consistently?
- If not, what issues or circumstances interfere?
- How can you resolve these issues or avoid these circumstances?

Men who have sex with both women and men face additional difficult issues regarding risk reduction. Ideally, discuss your sexual history with all your partners, both male and female, so that they may make informed decisions about risk reduction. Practice risk reduction with both women and men to avoid infecting yourself or others.

Frank discussion of risk reduction may be difficult for men who have not told their female partners about sexual relations with other men. If your sexual contact with men has never involved the exchange of bodily fluids, you pose no special risk to your female partners. However, if there is a chance that you may already be infected, you must practice risk reduction with your female and male partners by using condoms. If there is a chance you may be infected and you cannot tell your female partners, seek counseling from an AIDS organization in your community.

Post-exposure Prophylaxis

It is possible that infection may be prevented after an extremely high-risk exposure through immediate use of a combination of antiretroviral medications. This is known as “post-exposure prophylaxis” or “PEP.” It appears that treatment must begin within 72 hours after the possible exposure; many scientists believe that in order to be effective it may need to start sooner, perhaps within 12 hours. The treatment is continued for one month. For sexual exposure, PEP is indicated primarily for the receptive partner in anal or vaginal intercourse if the insertive partner is known to be infected or is highly likely to be infected.

There is no conclusive evidence that such treatment is effective. No studies on PEP after a high-risk exposure have been completed, as they present several logistical and ethical difficulties. Studies on occupational exposure prophylaxis (e.g., a health care worker who is accidentally injured with a dirty needle) are also somewhat inconsistent. However, a major study done by the CDC in 1997 found that AZT use in health care workers who had been exposed to HIV was associated with an 81% reduction in infection compared to non-treated health care workers.[145] Additionally, there is a rational scientific basis for believing that such treatment may prevent infection in at least some individuals.

PEP may prevent infection with HIV, but starting PEP is a serious decision. There are several difficulties with PEP:

- PEP may prove, in the long run, to be ineffective in preventing infection.
- PEP requires careful use of antiretroviral medications. Medications may have significant side effects, including fatigue and general malaise, nausea, diarrhea, and headaches. More severe side effects are possible but unusual and reversible.
- The medications are expensive.
- Many patients find the regime psychologically taxing and stressful.

Only those people who have had unprotected receptive vaginal or anal intercourse or shared needles with someone known or believed to be HIV-positive should seriously consider PEP. Timely action is essential.

If you think you need PEP and are part of the Columbia University community, *immediately* contact the GHAP office at 212-854-6655. If no one is available, contact Primary Care Medical Services, which is available 24 hours a day, seven days a week at 212-854-2284. You can also go to the St. Luke's Hospital emergency room at 1111 Amsterdam Avenue at 113th St (212-523-4000) or any other emergency room.

4

Testing for HIV

Medical opinion now strongly recommends that if you are at some risk of being HIV-infected, you should be tested so that you can benefit from recent dramatic advances in medical care if you test positive. People infected with HIV can now get special medical care *before* the development of any noticeable symptoms—care that has been shown to delay AIDS and extend healthy life. Since HIV may be transmitted mother-to-fetus, you should also be tested if you are thinking of having a child and if either you or your partner has any risk of infection (including having had multiple sexual partners).

DETECTING ANTIBODIES VERSUS DETECTING VIRUS

There are several possible ways to determine whether you are infected with HIV. With a few exceptions, the method commonly used is a test for the presence of *antibodies* to HIV, rather than a test for the virus itself. The antibody test is typically used because it is less expensive, technologically simpler to perform and interpret (and thereby more reliable), standardized, and widely available. Other tests detect the virus itself directly and may be useful in certain circumstances.

HIV ANTIBODY TESTING

The HIV antibody assay is a blood test that if used properly can tell you whether you have been infected with HIV. If proper testing procedure is followed, the test has an accuracy of greater than 99%.[146] The test indicates whether your blood contains antibodies to HIV.

Antibodies are proteins manufactured by your immune system that signal the presence of unwanted foreign material, such as bacteria or viruses, that may have entered your body. Each antibody is specific to a particular kind of foreign material.

A "positive" HIV antibody test result means antibodies to this virus were detected. A "negative" result means antibodies to this virus were not detected. If the test detects antibodies to HIV, it means that you have at some point been infected by HIV, that appropriate medical intervention will be helpful, and that you must consider yourself capable of transmitting the virus if you engage in specific risky activities. In contrast to many other infections, the presence of antibodies to HIV does not mean that you have successfully fought off infection.

HIV antibody testing is often incorrectly referred to as the "AIDS" test. Having a positive antibody test result does not mean you currently have AIDS; however, a positive result *does*

mean that you face a significant chance of dangerous illness in the future if you do not receive treatment.

Preconditions for Safe and Meaningful Testing

Testing is only safe, meaningful, and productive if certain preconditions are fulfilled. Before being tested, you should thoroughly understand the facts of testing.

Delay of Months Before Antibodies May Be Detectable

The body does not manufacture HIV antibodies immediately after infection. Most people develop measurable levels of antibodies in the blood within a few weeks after infection with HIV; the average time is 25 days. Almost everyone becomes antibody positive within three months of infection. Therefore, HIV antibody testing may only be completely meaningful if three months have passed since the last possible exposure to the virus. This three-month period is referred to as the "window period." If not enough time has passed, the antibody test result may be negative despite the fact that the virus itself is present.[147,148]

Accurate Testing Requires a Sequence of Tests on Every Blood Sample

HIV antibody testing provides accurate information only if it is done properly. A single blood specimen is tested with a sequence of tests. A very sensitive test called the EIA or ELISA (enzyme-linked immunosorbent assay) test is used first. This test will pick up any blood sample positive for HIV. It may produce false positives (be positive in the absence of HIV infection) because it cannot tell the difference between HIV antibodies and certain other antibodies that might be present.

The EIA is repeated twice if it is positive. If the blood sample is negative on both duplicate EIA tests, then the laboratory will report a negative result. If two of the three EIA tests are positive, a separate confirmatory test (usually the Western blot analysis) is performed on the same blood specimen. The Western blot test will usually eliminate false positives. If the Western blot analysis is positive, the laboratory will report a positive result. An alternative confirmatory test is the immunofluorescent assay (IFA).

After the proper sequence of testing is performed, the chance of a false positive test is miniscule; for example, one study indicates a six in one million chance of a false positive.[149] However, if you are at extremely low risk of being infected and test positive, you should be retested by an alternative method that tests for the virus itself rather than antibodies (see below).

On rare occasions, Western blot analysis results cannot be conclusively determined to be either positive or negative. Such results are reported by the laboratory as "inconclusive" or "indeterminate." If your test is indeterminate, consult with your testing counselor or health care provider. Direct tests for the virus can be done to determine whether you are positive or negative. If you are at low risk, the most likely cause of the indeterminate test is cross-reaction with another antibody or technical/clerical error. If you are at significant risk, an indeterminate test

probably means that you have become infected with HIV in the recent past. In either case, you should be retested by an alternative method that tests for the virus rather than antibodies.

Positive Result Indicates Opportunity for Treatment

If you have a positive HIV antibody test result, you must assume you are infected and could possibly infect others through certain types of sexual contact, needle sharing, child-bearing or breast-feeding. A positive HIV antibody test result indicates infection with HIV but provides no information about the current degree of illness or risk for opportunistic infections. Without treatment, at least 78% of HIV-infected people will develop AIDS within fifteen years of infection.[150],[151] Treatment will allow you to stay healthy.

Negative result does not indicate immunity

If you have a negative HIV antibody test result and the test was performed at least three months after the last possible exposure to HIV, your result indicates that you have not been infected with the virus, you cannot infect others, and you have no current risk of developing HIV-related illness. All people should be aware that a negative test result does not mean that you are immune to possible infection in the future.

Other HIV antibody tests

Testing for HIV-2

HIV-2 is a variant of HIV that is prevalent primarily in Africa, particularly western Africa. HIV-2 is transmitted through the same routes as HIV-1, and, like HIV-1, can cause AIDS. The HIV antibody test commonly available in the United States is a test for antibodies to HIV-1 and does not always detect infection with HIV-2. However, all U.S. blood banks as well as some labs test all blood for both HIV-1 and HIV-2. The test used by Health Services at Columbia and GHAP tests for HIV-2 as well as HIV-1.

Between 1987 and 1998, 79 persons were diagnosed with HIV-2 in the United States. All identified HIV-2 infected U.S. residents have been immigrants from Western Africa or their sexual partners.[152]

HIV-2 infection has a low prevalence in the United States, and the majority of cases are people of western African origin or their partners. West African nations with a greater than 1% incidence of HIV-2 are: Gambia, Guinea Bissau, Côte d'Ivoire, Cape Verde, Mali, Mauritania, Nigeria and Sierra Leone. Other African countries with a greater than 1% incidence of HIV-2 are Angola and Mozambique.

The rapid test

The US Food and Drug Administration (FDA) has approved several rapid HIV antibody tests that can deliver results in less than an hour.

Rapid tests can be performed on blood samples (finger stick or venipuncture whole blood),

plasma, or the inside of the cheek (buccal tissue). The latter is often referred to as the "saliva test," although it does not test saliva for the virus; it tests tissue collected from the cheek and gum by swabbing with a specially treated pad. Any reactive rapid test will be considered a "preliminary positive" until a confirmatory test (Western Blot) is performed. Because specimens for rapid testing are single use only, a second blood draw is required to confirm a reactive rapid test.

Rapid HIV antibody tests have been thought to be as sensitive as EIAs in detecting recent HIV infections, and thus have been used as a screening test routinely. Recently, however, the discovery of "false negative" rapid tests in and around Seattle has caused concern. Between September 2003 and June 2008, 16 HIV-infected men who have sex with men tested negative using the OraQuick Advance Rapid HIV-1/2 Antibody Test (some tests were on oral fluid and some on finger stick blood) but positive using either the 1st or 2nd generation EIA, through services funded by Public Health-Seattle & King County (PHSKC). In total, OraQuick detected 153, or 91%, of 169 antibody-positive MSMs. Most of the men who received a false negative with OraQuick had early infection, as indicated by a recent negative HIV test, symptoms consistent with acute infection, or Western blot evolution gathered from further testing.[153]

While the PHSKC study procedures *did* identify the 16 positive men through screenings other than rapid testing, such confirmation of negative rapid test results is not routine. Thus, the virus may be transmitted from someone who thinks they are negative.

In light of these recent discoveries as well as the more well known possibility of "false positive" rapid tests, public health organizations and scientists have been working toward reconciling the compromised accuracy of rapid testing with its potential to help identify more HIV infected people. The STD clinics run by the New York City Department of Health, for example, no longer offer the "saliva test," but perform the rapid test on whole blood, which is known to be more specific. Researchers at PHSKC believe that pooled HIV nucleic acid amplification testing (where specimens are pooled and then tested in groups using a more expensive but highly sensitive process that looks for evidence of the virus itself) should be the standard of care and integrated with antibody testing to act as back-up for false negative results in populations with high levels of HIV transmission and with frequent testing.

Since November 2005, Health Services at Columbia and GHAP tests venipuncture whole blood specimens using the OraQuick Advance Rapid HIV-1/2 Antibody Test. The convenience of in-house specimen processing and shorter wait time for results combined with the low level of HIV transmission in the population make the benefits of rapid testing outweigh the risks. Patients are carefully screened in pre-test meetings with counselors or health care providers, and appropriate counseling and alternative testing is provided to those at high risk for infection or who are still within the window period.

Home testing

Only one home test has been approved by the FDA: the Home Access HIV-1 Test System (phone number 1-800-HIV-TEST). This test is considered reliable and can be bought at a number of pharmacies, including Rite-AID. To use this "home" test, you prick your finger with a lancet provided in the kit, place the blood on special paper, and send it to a laboratory with an

anonymous personal identification number. Results and any counseling are provided by phone in seven business days. The manufacturer, Home Access Health Corporation, also provides an "Express" home test that provides results in three business days.

The laboratory uses a double EIA and, if the result is positive, a confirmatory IFA (immunofluorescent assay). Results are reliable. Be sure to check the expiration date on the package; the Home Access Health Corp. says that some pharmacies are selling expired kits. Disadvantages are the cost ($44) and the lack of in-person counseling.

For technical details of the different HIV antibody tests, see Appendix 1: Technical Details of Testing.

Viral testing

Several tests are available that detect the presence or absence of the virus itself in the blood. These tests are referred to as PCR (polymerase chain reaction) tests or NAATs (nucleic acid amplification tests). These tests detect RNA and DNA, the genetic material in HIV. These lab tests can detect even tiny amounts of viral genetic material within two to four weeks and thus resolve indeterminate antibody tests; however, they have not been approved by the U.S. Food and Drug Administration for diagnosis of infection and should be confirmed by an antibody test.[154] HIV RNA PCR tests are also used to measure the amount of virus in the blood of people who are HIV-infected (in order to assess the need to start or change medication) and to test blood supplies in most developed countries. DNA PCR tests are used to test babies born to HIV-positive mothers, as the baby retain some of the mother's antibodies for several months, making an antibody test less specific.

p24 Antigen Testing

A p24 antigen test is another type of HIV test. The p24 antigen is a protein that is part of HIV and is produced in excess early in the infection period, when there is an initial burst of viral replication (associated with a higher viral load and increased transmissibility). Because the p24 antigen test is highly specific and can detect HIV infection before the HIV antibody test, it is used for diagnosing HIV early in the course of infection. It is usually recommended that this test is taken 2-4 weeks after possible exposure to HIV. It is sometimes used in conjunction with antibody testing to reduce concern about the window period. The test is not especially sensitive and should not be used to confirm negative results. (Once antibodies are detectable, the p24 antigen will no longer be demonstrable, and the test would give a false negative.) In addition to early detection of infection, the p24 antigen test can be used for screening blood supplies.[155,156]

OTHER ADVICE ABOUT HIV TESTING

Prepare for Psychological Stress

A positive antibody test result will almost certainly cause you psychological distress. Living with this stress has been painful and damaging for many people according to evidence gathered by psychologists. In some cases, this stress has led to serious psychological problems, including severe anxiety and depression. It is best to discuss your situation with a trained HIV counselor both before you are tested and after you receive your result. Government sponsored anonymous test sites generally provide counseling. Counseling may be inadequate in private doctors' offices. Since testing positive may lead to great psychological stress, you should get additional support after such a test result, whether through friends, HIV support groups, or professional counseling. It may be helpful to locate sources of such support before being tested. At Columbia, contact the Gay Health Advocacy Project (GHAP) at 212-854-6655.

Discrimination Related to Testing

The HIV antibody test sometimes has social and legal implications. All 50 states and the District of Columbia now require confidential name-based reporting of HIV-positive people as well as people with CDC-defined AIDS. You can be tested anonymously in New York only at specific government anonymous test sites.

The legitimate purpose of reporting names and identifying information of people with HIV or AIDS is two-fold: to gather information about the nature and spread of the epidemic and to allow for partner notification. Many experts believe that information could be gathered with equal accuracy anonymously using a system known as "unique identification."

If you test positive in New York State, you may be contacted by state health officials who will request information about who your partners are and how to speak to them. The state will then notify your partners without giving your name. You are legally entitled to refuse to give this information. However, if you have given partners' names to the physician, clinic, or other site where you were tested, that facility is legally required to give such information to the state government.

The state currently keeps these records carefully guarded. It is not allowed to give this information to any other governmental or non-governmental organization. There appear to have been relatively few lapses in confidential treatment of data. Insurance companies do not have access to these records.

The federal government requires all applicants for immigration to the United States and all employees and applicants to certain programs to take the HIV antibody test. These programs include the Peace Corps, the Armed Forces, the state National Guard, and residential training programs of the Job Corps. People who are HIV-positive are denied entry to these programs.

Applicants for the Peace Corps who test positive are rejected, while those who become positive while serving may be medically separated and required to terminate prematurely. Consequently, you should consider being anonymously or confidentially tested before applying to join

any such organization, and consider withdrawing your application if you are positive.

The Foreign Service of the State Department formerly denied entry to HIV-positive applicants. However, in February 2008, a lawsuit led to a change in policy. HIV is no longer on the list of illnesses that automatically disqualify a candidate; people with HIV will be considered on a case-by-case basis to determine whether they have "worldwide eligibility," as is the case with cancer and other medical conditions.

Large Scale Coercive Testing Programs Not Advisable

Many proposals for large-scale coercive HIV antibody testing programs have been suggested; few of these proposals have been supported by responsible epidemiologists and public health officials.[157] The debate over coercive testing is often wrongly characterized as a conflict between the public health and the civil rights of HIV-infected people. This misconception rests on the false premise that coercive testing would prevent new infections. HIV can be transmitted by unsafe sexual activity and through needle-sharing. Since these are voluntary behaviors, new infections through these routes could be best be prevented by appropriate education and persuasion. Testing cannot stop new infections without the cooperation of the public. This cooperation can be attained through education and voluntary anonymous testing programs.

No Need for Testing in Work Settings

According to the U.S. Public Health Service, there is no reason anyone needs to be HIV antibody-tested to protect others at their place of employment, even if they work with children or in a health care setting.

5

Treatment

EXPLANATION OF CHAPTER

This chapter provides a brief overview of the treatment of HIV disease. It summarizes the consensus of medical and scientific opinion in 2009 and necessarily omits and oversimplifies some issues. Information about HIV treatment changes rapidly, and inevitably some specific details will be outdated by the time you read this. However, principles of treatment do not change quickly, and this chapter will provide a basic model of effective medical care for HIV-infected people.

The most authoritative guidelines for treatment can be obtained through the National Institutes of Health (NIH). The current recommendations can be found online at http://aidsinfo.nih.gov/contentfiles/AdultandAdolescent_GL.pdf. In addition to consulting the information provided by the NIH, you can find reliable information at the following websites:

- CDC: www.cdc.gov/hiv
- AIDSmeds: www.aidsmeds.com
- U.C.S.F.: *The AIDS Knowledge Base*: www.hivinsite.ucsf.edu/
- AIDSmap: www.aidsmap.com
- AVERT: www.avert.org

Columbia students should contact GHAP (212-854-6655) for information about treatment with an HIV expert. This treatment is covered by the Columbia Health Insurance plan.

For people without insurance, an excellent source of high quality care is available at the Center for Special Studies at New-York Presbyterian Hospital. You can use Medicare, Medicaid, or ADAP insurance at this clinic.

Payment for medication is available to New York State residents through the ADAP (AIDS Drug Assistance Program). This program will pay for medication for those earning under $44,000 a year. Other states have ADAP programs with different levels of eligibility.

For information about ADAP (which also provides access to medical care), see:

www.health.state.ny.us/diseases/aids/resources/adap/index.htm

CURRENT STATE OF TREATMENT

The good news about treatment of HIV disease is dramatic: medication is available that can prevent illness and death and significantly extend the life of HIV-infected people. Those who receive proper medical care at the right time in the course of infection are likely to have an essentially normal lifespan. Further, such treatment can extend healthy life for years.

However, the treatment now available does not eradicate the virus from the body, and in this sense it is not a cure. Ongoing medical monitoring and continuous use of medication are necessary. Medications have both long-term and short-term side effects. Further, treatment requires money for medical expertise, medication, and laboratory tests; it is not available to the vast majority of HIV-infected people worldwide.

The most significant advance has been the development of various effective antiretroviral medications that are used in combination. This treatment is referred to as HAART (highly active antiretroviral therapy). The drugs halt or slow the replication of the virus, limit damage to the immune system, and frequently restore immune function and thus prevent opportunistic infections, the cause of illness and death in HIV disease. A tremendous increase in knowledge about the virus is opening routes for the development of new categories of antiretrovirals.

Tests that accurately track the level of virus in the body and resistance of virus to medication allow for more effective use of drugs. Improved treatment and prevention of specific opportunistic infections has also helped lessen illness and death from HIV disease.

Evidence that currently available medication works

Deaths from AIDS in the US rose every year from 1981 to 1995, when they reached a peak of 50,000.[158] HAART began to be used in 1996, and by the year 2006, AIDS deaths had dropped to less than 15,000.[159] Although some of this drop is due to other factors (such as changes in patterns of transmission), it is largely the result of improved treatment of HIV disease.[160]

Several large studies have followed the course of people with HIV disease both before and after the use of HAART. *The Adult/Adolescent Spectrum of Disease Project* looked at 49,000 HIV-infected people beginning in 1990. People not taking drugs were six times more likely to die than comparable patients taking a three-drug antiretroviral regime.[161] Another study, *The HIV Outpatient Cohort,* followed 3500 patients beginning in 1992. The death rate among people not on medications was 4.5 times higher than that of those taking a drug combination that included a protease inhibitor.[162]

The San Francisco Department of Health has tracked about 95% of the city's HIV-infected patients. People taking a drug combination including a protease inhibitor were 57% less likely to die than people not taking drugs.[163]

While the vast majority of news about treatment is positive, the potency of antiretroviral treatments and the resultant longer life expectancy have led to recognition of the side effects that may accompany therapy. Fortunately, the wider choice of drugs now available and research on side effects is leading to a reduction in these problems.

NEED FOR EXPERT DOCTOR

It is important to see a physician who is an expert in HIV disease and has treated many HIV-infected patients. HIV care has become a medical specialty of its own. Information is fast-changing and complex. Physicians not experienced in treating HIV patients are usually not adequately informed, even if they are otherwise excellent doctors.

Physicians with significant HIV practices are often part of an informal network and keep each other up to date on recent developments, including experimental treatments. A number of factors will play a part in your choice of doctor. HIV expertise is not the only variable, but it is a crucial one. If you cannot receive care from an HIV specialist because of geographic or financial factors, try to seek periodic consultation from an HIV specialist who can collaborate with your regular physician.

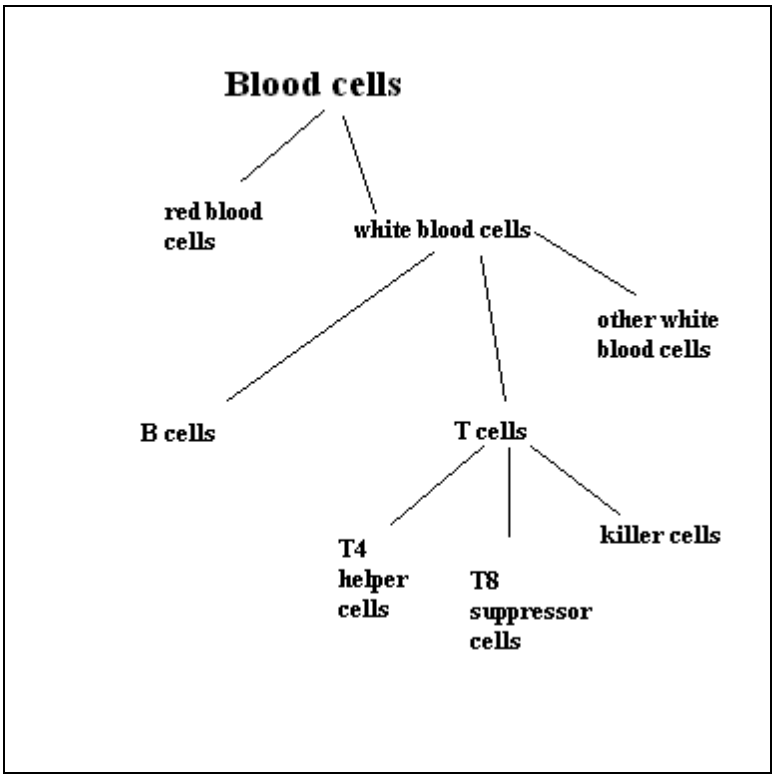
One of the important facts to remember when choosing a doctor and deciding upon treatment is that “one size does not fit all.” A doctor who is an expert in HIV will be knowledgeable about treatment options and will be able to describe current recommendations guiding the timing and choice of therapy. You and your doctor will individualize treatment based upon many factors, including specific laboratory tests, general physical condition, and the presence or absence of any symptoms. Assessments of your lifestyle, age, other health factors, and your readiness for treatment are equally important in making a treatment recommendation.

UNDERSTANDING HIV DISEASE

In order to understand the use and benefits of antiretroviral medication, it is necessary to learn some basic facts about the course of HIV disease and the laboratory tests (CD4 cell and viral load) that are used to monitor it.

T cell count

A T cell count (also known as a T4 count or CD4 count) measures the presence in the blood of a certain kind of white blood cell, the CD4 lymphocyte or T4 cell. The chart below shows how CD4 cells fit in the structure of blood.



CD4 cells are critical in helping the body mount an effective immune response. They signal the immune system to "turn on" in order to fight infections. Paradoxically, CD4 cells are also the major targets of HIV.

A CD4 cell count measures the number of CD4 cells per cubic millimeter of blood (there are five cubic millimeters in a teaspoon). As HIV disease progresses, it destroys CD4 cells and thus eventually interferes with the functioning of the immune system. CD4 cell counts are used to measure how much damage (if any) has been caused to the immune system. A normal CD4 count is somewhere between 500 and 1500. When a CD4 cell count falls below 200, a person infected with HIV is susceptible to a variety of opportunistic infections and is considered to have AIDS by the definition developed by the CDC.

The status of the immune system can also be measured by looking at the percentage of CD4 cells present in the total number of lymphocytes, a type of white blood cell that plays an important part in the immune system. A normal percentage is 32 to 68%. Generally, the immune system is functioning adequately when the CD4 percentage is 21% or higher.

HIV can damage the immune system in several ways. In addition to directly destroying CD4 cells, the infection of CD4 cells causes the immune system to go into "overdrive." As a result, T cells of all types produce chemicals that stress the immune system and further damage other CD4 cells.

When HIV-infected people are successfully treated with antiretroviral medication, T cells gradually increase. This correlates with the improvement of immune system functioning as evidenced by a significant drop in HIV-related infections. Once the immune system has been

adequately reconstituted, HIV-infected patients who previously had low CD4 cells can frequently discontinue preventive medication for many opportunistic infections (see chapter 1 for examples). This should be done only in consultation with a physician.

Viral load

A viral load count (also known as viral burden) measures the amount of HIV circulating in the blood; it counts the copies of the virus in a cubic millimeter of blood. Viral load, in combination with other lab tests and clinical markers, may be a consideration in the decision to start antiretrovirals. Measurement of viral load is critical for evaluating response to therapy. Commonly used tests are referred to as PCR (polymerase chain reaction) and bDNA (branched DNA). The type of test will be listed in your lab results.

Viral load is a direct measurement of how active infection is and is a very good predictor of how fast HIV disease is likely to progress. A high viral load (above 100,000 copies) means that there is a high level of virus in the blood and body, many T cells are being infected and destroyed, and the immune system is in danger of significant damage. A low viral load (less than 10,000 copies) means there is a smaller amount of virus in the blood, fewer T cells are being destroyed, and much less damage to the immune system is occurring. Studies show that less than 5% of all AIDS-defining complications occur in people with a viral load less than 5,000.[164,165]

Data about viral load and CD4 cell count from a large cohort of patients have been used to predict the likelihood of the development of an AIDS-defining opportunistic infection in the absence of treatment.[166] The following tables summarize the findings:

CD4 count less than 350:

		% AIDS-Defining Complications		
VIRAL LOAD	**NUMBER OF PATIENTS**	**3 YEARS**	**6 YEARS**	**9 YEARS**
1,500 to 7,000	30	0	18.8	30.6
7,000 to 20,0000	51	8.0	42.2	65.6
20,000 to 55,000	73	72.9	92.7	95.6
Greater than 55,000	174	72.9	92.7	95.6

CD4 count 350 to 500:

		% AIDS-Defining Complications		
VIRAL LOAD	**NUMBER OF PATIENTS**	**3 YEARS**	**6 YEARS**	**9 YEARS**
1,500 to 7,000	47	4.4	22.1	46.9
7,000 to 20,0000	105	5.9	39.8	60.7

20,000 to 55,000	121	15.1	57.2	78.6
Greater than 55,000	121	47.9	77.7	94.4

CD4 count greater than 500:

		% AIDS-Defining Complications		
VIRAL LOAD	**NUMBER OF PATIENTS**	**3 YEARS**	**6 YEARS**	**9 YEARS**
1,500 to 7,000	180	2.3	14.9	33.2
7,000 to 20,0000	237	7.2	25.9	50.3
20,000 to 55,000	202	14.6	47.7	70.6
Greater than 55,000	141	32.6	66.8	76.3

If the amount of virus present in the blood is too low to be measured, viral load is considered undetectable. This does not mean that there is no virus present in the body; less than 5% of HIV in the body is present in the blood.

There are two commonly used tests to measure viral load. One is referred to as branch DNA, or bDNA; the other as reverse transcriptase polymerase chain reaction, or RT-PCR. The tests use different laboratory techniques to measure the amount of virus in blood. PCR amounts are slightly less than double those of bDNA; e.g., a viral load of 55,000 copies on PCR is the equivalent of 30,000 copies on bDNA.

If you are HIV-infected, it is important to measure CD4 count and viral load to determine when to start or change medication in order to prevent progression of the disease. To speak metaphorically, CD4 count tells you how far away the danger zone is and viral load tells you how rapidly you are approaching this zone.

Course of disease without treatment

Following is a description of the course of HIV disease without treatment. This is the typical course of illness, the statistical norm. A small number of people who are HIV-infected never progress to AIDS, while others become ill quickly.

Without treatment, the average time from seroconversion to symptoms severe enough to meet the definition of AIDS is ten to twelve years. Sex, race, and risk category do not affect rate of progression if data are adjusted for quality of care.

Here are the stages of HIV disease:

- **Viral transmission**

The virus enters the body through a mucous membrane or the bloodstream and is carried to the

local lymphoid tissues.

- **Primary HIV infection**

HIV is disseminated to the brain and central nervous system and lymphatic tissue (lymph nodes, spleen, tonsils, and adenoids). Lymphatic tissue is the major reservoir of HIV in the body.

Ten to thirty days after infection (median 2-4 weeks), about 80 to 90% of people develop what is called "acute retroviral syndrome" or "primary HIV infection." This is an illness that resembles the flu and usually lasts about one to two weeks. Symptoms include fever, swollen glands, sore throat, faint rash that generally starts in the torso, sores on the mouth and sometimes around the anus, weight loss, and muscle or joint pain. (See "When to begin medication" for further information). Remember that many of these symptoms are common in a variety of illnesses other than acute HIV infection. For a detailed chart of acute HIV infection symptoms, see Appendix 2.

During the first two to three months of HIV infection, viral load may be high and the CD4 count drops below normal. After a few months, the CD4 count generally rises close to normal levels and viral load drops. Viral load stabilizes at about 3 to 9 months to what is known as a viral "set point." A higher viral set point and more severe acute retroviral syndrome symptoms are considered predictors of more rapid progression to AIDS. It is important that people who might have acute HIV infection seek medical attention because most experts recommend at least short-term treatment during this period.[167, 168] The management of acute HIV infectionremains an area of research and current guidelines recommend referral to a research center for evaluation and possible treatment.

Most people become positive on an antibody test at about three weeks after infection. However, the way to diagnose acute infection is with the simultaneous use of viral load testing with antibody testing and sometimes p24 antigen testing. It is important to understand that during the first three weeks after infection – acute infection – the antibody test may be negative while the viral load is very highs. During this period, the newly infected person may be asymptomatic but infectious to others.

- **Asymptomatic infection,**

During the next two to six years, most people remain asymptomatic, although they may have chronic swollen glands (lymphadenopathy). Despite lack of symptoms, HIV disease is progressing. On average, CD4 cells decline at a rate of approximately sixty points per year, while viral load gradually increases.

- **Symptomatic HIV infection**

After some years, a variety of medical symptoms may develop, often involving skin and gastrointestinal disorders. Viral load continues to rise, and the CD4 count shows a more accelerated decline about 1.5 to 2 years before development of AIDS-defining illness.

- **AIDS**

CD4 cells drop below 200. Opportunistic infections develop.[169]

The clear categorization of HIV into stages has become blurred by the ability of HAART to restore immune function, elevate T cells, and permit AIDS-related infections and conditions to be cured, thus halting or even reversing this course.

Goal of treatment

At some point in the future, there may be a cure for HIV disease, perhaps a way to eradicate the virus from the body. At the present time, the goal of treatment is to halt or at least significantly slow the process described above. If the virus can be controlled with antiretroviral drugs, the immune system can function competently and no opportunistic infections will develop. This is the purpose of antiretroviral treatment. One AIDS expert summarizes large medication studies in the following way: "The results from these [studies] have been astonishingly consistent…: When HAART is introduced, opportunistic infections and deaths drop."[170]

Most people who start HAART for the first time reach the goal of becoming undetectable on viral load tests. In studies of these regimens, up to 90% of people who take the medications as directed, every day, without fail, achieve an undetectable viral load. This typically takes about four to six months. You can remain healthy even if your viral load does not become undetectable. However, because reducing viral load to undetectable predicts a more durable response, this is generally the goal of first-time treatment.

CD4 levels gradually rise as viral load drops. On the average, the CD4 count will rise 100 to 200 in the first year after the virus becomes undetectable. After one year, it continues to rise at a more gradual rate.

HAART involves treatment with multiple drugs, most typically a total of three drugs. Multiple drugs are necessary to suppress HIV replication and to prevent the virus from becoming resistant to the medication.

When to begin medication

The US Public Health Service (USPHS) recommends that you should begin medication if:

- your CD4 count is lower than 350, regardless of viral load;

or

- you have had any opportunistic infections or HIV-related symptoms, such as persistent fever or weight loss;

or

- you are pregnant;

or

- you have a diagnosis of HIV-associated nephropathy (kidney disease caused by HIV infection);

or

- you are also infected with Hepatitis B and will be receiving treatment for it.

Antiretroviral treatment may be considered for some patients with greater than 350 CD4 cells (see below). Some experts also recommend treatment if you have become infected within the last six months.

You can check on current treatment guidelines at http://aidsinfo.nih.gov/Guidelines/Default.aspx?MenuItem=Guidelines.

There is a debate in the medical and research community about starting treatment early. This comprises two overlapping but distinct questions: first, should you begin treatment when your T4 cells are over 350, and second, should you begin treatment if you can be treated during acute infection.

Research so far indicates that there are probably advantages and disadvantages of beginning treatment when your T4 cells are over 350. The advantages are:

- Medication may help you maintain a high T4 cell count and therefore prevent possible irreversible damage to the immune system.
- Medication will lower your viral load and make you less likely to infect others.
- Medication may prevent a number of diseases that can occur when T4 cells are over 350, including Kaposi's sarcoma, peripheral neuropathy, and non-Hodgkin's lymphoma. It may also decrease your risk of health problems that occur more frequently in HIV-infected people. These include kidney and liver disease and cardiovascular problems.

However, there is also an argument to be made against starting medication when your T4 cells are over 350. You risk increased side effects and drug resistance, and better HIV drugs—that are more effective and have fewer side effects—may be available before you would definitively need treatment.

A recent review of over 17,000 HIV positive patients compared patients who began antiretroviral treatment at different stages if the infection. A group of 2,084 patients began therapy when their CD4 cells ranged from 351 to 500 while a comparable group of 6,278 patients postponed treatment until their counts were 350 or below. After adjusting for other demographic and clinical characteristics, the latter group had a 69% greater risk of death. Another 9,155 patients with CD4 counts greater than 500 were tracked. Of these, 2,220 began therapy within 6 months, while 6,935 postponed therapy. Among those who deferred therapy, the risk of death was 94% greater than those who initiated medication early on.[171]

Another recent analysis of treatment data of over 20,000 patients showed that patients who initiated medication with a CD4 count between 351 and 450 had lower rates of progression to AIDS and death than those who began therapy with a CD4 count between 250 and 350.[172]

A different set of issues is involved in the question of treatment in the first few months immediately after infection, particularly when the infected person still has the symptoms of acute HIV. The theory behind treating HIV at this point is the possibility that this intervention may prevent irreversible destruction of CD4 memory cells (primarily those in the gut) and thereby confer lasting immunological benefit. No data are currently available from random controlled trials; a large trial known as SPARTAC should yield results in two to three years.[173] There are additional trials available investigating the utility of intensive therapy shortly after infection. Referral to these trials should be considered when acute HIV infection is diagnosed.

In New York City, trials of treatment for acute infection are available at the Aaron Diamond AIDS Research Center. You will receive state-of-the-art care and free medication. Further information is available at:

http://www.adarc.org/newly_infected_521.html

or call 212 327 7290 or 212 448 5020

It is difficult to start taking medication that may have serious side effects if you feel good and have no symptoms. Remember, however, that you can feel completely healthy despite a high viral load and low CD4 cells and thus still be in danger of developing a life-threatening opportunistic illness without warning. Also, the decision to start therapy and the type of therapy you select must be individualized.

The U.S. Public Health Guidelines were revised in 2008 and will certainly be revised again as new drugs and data are produced. Earlier guidelines had suggested starting at a higher level of CD4 count and a lower level of viral count. The changes were made to reflect growing concern about side effects from prolonged use of medication.

Classes of drugs

Each stage of the reproductive cycle of the virus—attachment, uncoating, reverse transcription, protein synthesis, particle assembly, and budding--provides an opportunity for anti-

HIV drugs to halt the reproduction and spread of the virus. As our understanding of HIV grows, additional categories of antiretroviral drugs are discovered. All current antiviral agents work by preventing both reproduction of the virus and infection of susceptible cells. They do not kill the virus nor do they kill cells that are already infected. Effective treatment requires the use of drugs from at least two classes of medication.

Following are the classes of medication currently available:

- Nucleoside reverse transcriptase inhibitors (NRTIs; also known as nucleoside.nucleotide analogues) inhibit a viral enzyme (reverse transcriptase) that converts the RNA in HIV into DNA allows it to reproduce.

- Nonnucleoside reverse transcriptase inhibitors (NNRTIs) also inhibit the viral enzyme (reverse transcriptase) that converts the RNA in HIV into DNA and allows it to reproduce. However, it does so with a different mechanism that the NRTIs,

- Protease inhibitors (PIs) disable a chemical necessary for the effective organization of the structure of new copies of HIV.

- Fusion or entry inhibitors prevent the virus from entering susceptible cells. These drugs are also known as chemokine coreceptor antagonists and include two subclasses (CCR5 antagonist and CXCR4 antagonist) prevent the entry of HIV into target cells. They bind to coreceptors (either CCR5 or CXCR4) on the surface of CD4 cells. By doing so, they block a required step in viral entry.

- Integrase inhibitors bind a viral enzyme known as integrase and thereby interfere with the incorporation of reverse-transcribed HIV DNA into the chromosomes of host cells.

For more information on the life cycle of HIV and how these drug classes interfere with viral reproduction, see Appendix 3: The Mechanics of HIV.

All HIV treatment involves use of at least three medications. If fewer than three are used, you are likely to develop resistance to a drug or even the whole class of medications to which that drug belongs. Sometimes, three different types of medication are combined in one or two pills.

Available antiretroviral medication

Drugs approved as of March 2009

BRAND NAME	GENERIC NAME	ABBREVIATION
Entry inhibitors (including fusion inhibitors)		
Fuzeon	Enfuviritide	ENF
Selzentry (US), Celsentri	Maraviroc	MVC
Nucleoside/nucleotide reverse transcriptase inhibitors (NRTIs)		
Retrovir	Zidovudine	AZT or ZDV
Videx or Videx EC (time release)	Didanosine & Videx EC	ddI
Zerit	Stavudine – generally not used because of side effects	d4T
Epivir	Lamivudine	3TC
Combivir	Zidovudine/lamivudine combination	AZT/3TC combination
Ziagen	Abacavir	ABC
Trizivir	Zidovudine/lamivudine/abacavir combination	ABC + AZT + 3TC
Epzicom	Abacavir/lamuvudine combination	ABC + 3TC
Emtriva	Emtricitabine	FTC
Viread	Tenofovir disoproxil fumarate	TDF or Bis(POC) PMPA
Truvada	Tenofovir DF/emtricitabine combination	TDF + FTC
Non-nucleoside reverse transcriptase inhibitors (NNRTIs)		
Viramune	Nevirapine	NVP
Rescriptor	Delavirdine	DLV

Sustiva	Efavirenz	EFV
Intelence	Etravirine	
Integrase inhibitors		
Isentress	Raltegravir	RGV
Protease inhibitors (PIs)		
Invirase	Saquinavir (hard gel cap)	SQV(hgc)
Crixivan	Indinavir	IDV
Norvir	Ritonavir	RTV
Viracept	Nelfinavir	NFV
Agenerase	Amprenavir	APV
Kaletra	Lopinavir/ritonavir combination	LPV/r
Aptivus	Tipranavir	TPV
Lexiva	Fosamprenavir	FPV
Prezista	Darunavir	DRV
Revataz	Atazanavir (usually used in combination with retonivir)	ATV
Multi-class combination drugs		
Atripla	Efavirenz (NNRTI) / tenofovir (NRTI) / emtricitabine (NRTI) combination	EFV + TDF + FTC

Several of the newer medications (Selzentry, Fuzeon, Isentress, and Intelence) have currently been approved by the FDA for use in patients who have become resistant to other medication. Ritonivir (one of the protease inhibitors) is now rarely used alone due to side effects at the dose that would be required. However, it is often used in combination with other protease inhibitors to "boost" the other protease inhibitor, that is, to increase the amount of drug available to

the body by affecting metabolization of the drug. Other drugs to boost medication, known as pharmacokinetic enhancers, are in development

For a more complete description of HIV antiretrovirals, see the following sites:

National Institutes of Health AIDSinfo Drug Database:

http://aidsinfo.nih.gov/DrugsNew/Default.aspx?MenuItem=Drugs

UCSF HIV InSite Adverse Effects of Antiretroviral Drugs: http://hivinsite.ucsf.edu/InSite?page=ar-05-01

UCSF HIV InSite Antiretroviral Management:

http://hivinsite.ucsf.edu/InSite?page=md-rr-13

The AIDS Infonet:

www.aidsinfonet.org/fact_sheets/view/401

The Well Project:

http://www.thewellproject.org/en_US/Treatment_and_Trials/

VIRAL RESISTANCE

A major problem in the use of antiretroviral drugs has been the ability of the virus to become resistant to medication, rendering the drug ineffective. HIV is very active in the body even when no clinical problems exist. In fact, billions of new viral particles can be made and cleared from the body every day. This level of reproduction allows for rapid mutation of the virus. If you are taking medication but the reproduction of the virus is not completely blocked, the virus can become resistant to the medication you are taking. At the present time, no single drug is effective enough to lower reproduction of the virus to a level that will prevent resistance. This is the reason a combination of medication is used.

Nature makes frequent errors in transcribing the genetic code of HIV-enzymes. Some of these errors allow HIV to escape the effect of HIV therapy. Over time, virus types that are resistant to medication become the predominant types in the body. This is known as selective pressure. Use of multiple drugs (usually at least three) reduces the ability of the virus to escape inhibition and

mutate successfully. In addition, lowering replication of HIV through use of antiretrovirals decreases the number of new viral particles produced and thus the number of mutations. As viruses mutate they may also become less "fit," that is, less able to replicate.

The goal of HAART is to reduce the level of virus in the body as much as possible while preventing or reducing the production of mutations, which make the virus resistant to a drug. While resistance may result from selective pressure on its own, it is primarily caused by not taking drugs properly, that is, by skipping too many doses or discontinuing one drug while continuing to take others. Resistance can also be caused by a combination of drugs that does not adequately limit reproduction, or low drug levels caused by poor absorption of medication.

Viruses may become resistant not only to an individual drug, but also to some or all of the drugs in its category. This is known as "cross resistance." Some medications, such as 3TC and the NNRTIs, develop cross-resistance easily and should only be used if you are sure you can always take the medication precisely as prescribed. Medication should be used in combinations that do not reduce future options by causing the virus to become resistant to entire categories.

In order to choose the best combination, the virus in your body should be tested for resistance to various drugs. Resistance testing is done prior to the initiation of the first antiretroviral treatment regime and if you do not respond to treatment after a certain period of time. There are two types of resistance testing available, referred to as genotypic and phenotypic testing.

A phenotypic test measures the ability of the virus to reproduce in the test tube in the presence of anti-HIV drugs. It is reliable but expensive and takes some time to get back results. A genotypic test sequences the genes of the HIV in your body to show where mutations have occurred. It is quicker and less expensive than the phenotypic test but requires expert interpretation. A newly developed test, known as the virtual phenotype test, may combine the advantages of both tests.

Resistant strains of the virus may be transmitted from one person to another. It is estimated that about 5 to 15% of HIV positive people who have never received antiretrovirals become infected with a detectable level of drug resistant virus.[174] If no medication is taken, the majority of virus will revert to so-called "wild virus," that is, virus that does not contain any drug resistant mutations. However, some virus containing the mutations will persist in the body. If treatment is started with this antiretroviral, wild type virus will be reduced and the resistant virus may become predominant, causing medication failure. This is why resistance testing is done prior to the initiation of treatment.

HAART GUIDELINES

This information is based on recommendations from *Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents,* US Department of Health and

Human Services, Developed by the DHHS Panel on Antiretroviral Guidelines for Adults and Adolescents – A Working Group of the Office of AIDS Research Advisory Council (OARAC) Nov. 2008.

http://www.aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf

Starting medication

Resistance testing will be the main factor in determining which drugs you will take when beginning antiretroviral treatment. In addition, your physician will consider other medical problems you may have and potential side effects, convenience issues, and adherence.

Generally, if you have not been previously treated, your doctor will recommend that you start on a combination of three drugs:

- Two nucleoside reverse transcriptase inhibitors and one protease inhibitor (but never d4T and AZT together)

Or

- Two nucleoside reverse transcriptase inhibitors and a non-nucleoside transcriptase inhibitor.

For a detailed table of treatment options for patients who have not previously taken antiviral medication, see Appendix 4: Medication Guidelines for Treatment-Naïve Patients.

Monitoring medication

With currently available medication, 95% of people on antiretroviral medication need to continue taking medication indefinitely, according to studies so far conducted. In a study, patients who had maintained undetectable viral loads for two to three years returned to pre-treatment viral set point within twelve weeks after discontinuing medication.[175] After viral load is undetectable, monitoring of viral level and CD4 cells should be done every three or four months. Some drugs require other lab tests in order to assess possible harmful side effects.

Discontinuing medication

Stopping medication should be planned with your physician because discontinuation of antiretroviral therapy may result in the virus returning to a higher level (viral rebound), further decline in the immune system and clinical progression. Stopping only one or two of three

medications leads to an increased likelihood of developing resistance. NNRTIs (Sustiva, Viramune, Rescriptor, Intelence, and Atripla) need to be stopped a few days earlier than other medications because they remain in the body longer. Your physician should always be involved in any decision about when and how to stop medication.

Changing medication

Medication may need to be changed for two reasons. First, if side-effects make taking a particular combination of drugs unacceptable, you may be able to tolerate other drugs.

Second, you may need to change drug combinations if the drugs are not working adequately. You will know medication is ineffective if:

- You are starting medication for the first time and your viral load does not decrease by 90% in eight weeks.

- Two successive viral load tests show a significant increase in viral load, as this means the drugs are no longer working. Some studies show that if you have been taking the drugs as prescribed, the most likely reason for this is that the virus has developed resistance to the drugs. Your doctor will perform resistance testing while you are still taking medication to determine which drugs are still likely to be effective (see below).

Some patients do not respond to typical HAART regimes and may require more drugs. These are usually people with very low T cell counts (less than 50) and high viral loads (greater than 100,000) or people who have previously been treated with medication and have become multi-drug resistant. More recently, however, with the use of resistance testing and new drugs, many of these patients may still be treated with effective three drug regimes.

If you have become resistant to several medications, you may want to investigate the possibility of entering a clinical trial. This is a way of obtaining new types of medication that may still be effective for you. It is also a way of obtaining medical care and medication free of financial cost.

MEDICAL PROBLEMS IN HIV TREATMENT

Antiretroviral medications do have significant side effects. These side effects vary from medication to medication and from person to person. Most people find the short-term side effects mild and transient; others experience them more severely and persistently. Your physician will try to choose medication that is most effective and causes the fewest side effects. Fortunately, now that so many antiretroviral drugs are available, it is easier to create a medication regime that avoids as many side effects as possible.

HAART has only been in use since 1996, and even the oldest HIV drugs have been used for a limited time. Consequently, information about long-term side effects is emerging gradually. There is no point in trying to minimize the fact that taking a combination of powerful drugs has potential long-term risks. However, it is important to remember that you are accepting these risks because the alternative is a life-threatening illness.

In some cases, scientists understand how certain medications cause specific side effects; in other cases it is not known. In addition, many symptoms may be caused both by drugs and by HIV itself.

Starting medication

The most common short-term side effects to HAART are diarrhea, nausea, and other gastrointestinal symptoms; headache; rash; fatigue; and, for some people, a difficult-to-describe feeling of disorientation or "spaciness." Sustiva, a commonly used non-nucleoside reverse transcriptase inhibitor, frequently causes mental changes such as nightmares and/or symptoms of depression or anxiety.

Generally, side effects are worst in the first few weeks to months of taking medication. The anxiety related to starting medication might exacerbate symptoms. You should report side effects to your physician and feel free to ask questions about expected severity and duration. Many physicians hesitate to describe side effects to patients as they fear that this will increase their rate of occurrence. Decide for yourself how much information is best for you.

GI (gastrointestinal) problems like diarrhea, nausea, and vomiting are among the most common side effects of HAART. They occur most frequently when you begin taking medication, generally in the first one to three weeks. They may also be a problem for people with low T cells and advanced HIV disease, as these may have done damage to the GI tract that exacerbates the medication's side effects.

Diarrhea can be treated with certain medications that can be purchased over-the-counter. A so-called BRATT diet (bananas, rice, apple juice, apple sauce, toast, and non-caffeinated tea) is helpful for severe diarrhea. Some foods may make diarrhea worse. These include caffeinated beverages; dairy products; any fried, spicy, or fatty foods; raw vegetables; brown rice; and beans. Drinking more fluids (three quarts per day) will help you avoid dehydration. You should report severe vomiting to your doctor. Nausea can be helped with certain prescription drugs and, anecdotally, marijuana. Small meals and bland food may help. If the nausea persists, you may have to change drugs.

You may have short-term adverse responses to medication that will show up on lab tests or physical exams. It is important to see your doctor regularly and obtain suggested lab tests.

Potential Side Effects

Following is a description of some of the most common side effects of antiretroviral medication. However, "most common" does *not* mean that most people taking these drugs will develop these side effects. In fact, most patients develop either no or few side effects. As new treatment methods develop, it becomes increasingly possible to avoid more serious side effects. Again, it is important to emphasize that the medical risk of not receiving treatment is much greater than the risks of treatment.

Lipodystrophy

Lipodystrophy is one of the potential long-term side effects of HAART. This is a general and non-specific term used to describe a complex of problems related to changes in the amount of lipid (fat) and its distribution within the body. They include fat loss and redistribution. A study referred to as FRAM (Fat Redistribution and Metabolic Change in HIV Infection) has been the most recent large clinical trial to look at this issue. [176,177]

Lipoatrophy is a loss of adipose tissue (body fat). It typically occurs in the face, arms, legs, and buttocks and, if severe, can produce a significant change in appearance. The FRAM study showed that HIV-positive men had a 38% chance of developing lipoatrophy as compared to 4% of non-HIV-infected men. In women, 28% of HIV-positive subjects had lipoatrophy as compared to 4% of negative women.

Lipohypertrophy is build-up of fat, often in the back of the neck and shoulders, breasts (particularly in women), and gut (visceral fat which is deep in the body). The last is particularly worrisome because it is associated with higher rates of cardiovascular disease. However, the FRAM study (which has been controversial) did not show an increased rate of lipohypertrophy when compared to uninfected subjects. Additionally, the study showed that lipodystrophy and lipohypertrophy did not occur in the same subjects. The FRAM study had a number of limitations, and it is still not clear whether lipohypertrophy should be considered part of lipodystrophy.

The causes of lipodystrophy are unclear, and several factors are probably involved in the range of symptoms. Medication is almost certainly a factor. Now that there is a wide variety of medication, those that seem associated with lipoatrophy can be avoided, and as such lipoatrophy is becoming much less common. People who begin treatment with lower CD4 counts seem to be more at risk for lipodystrophy.

Hyperlipedemia

Hyperlipedemia means increased cholesterol and triglycerides in the blood. These may increase the risk for cardiovascular events (heart problems) and stroke. Additionally, high triglyceride level may increase the risk of pancreatitis, a serious disease of the pancreas.

Hyperlipedemia itself does not cause symptoms but is detected by laboratory tests that measure these fats. These blood tests are called a “lipid profile,” and if you are on medication, you should have these blood tests at least once a year. You should have a fasting blood test, that is, a test for lipids after you have not eaten for eight to twelve hours.

Both medication and HIV itself may cause increased lipid levels in the blood. You may be able to change your HIV medication regime to ones less likely to cause these problems.

You can help control lipid levels with a healthy diet, exercise, and moderate use of alcohol. Oral contraceptives may also increase your risk. Other risk factors are diabetes, hypothyroidism, and genetic factors.

Hyperglycemia

Hyperglycemia means an increased level of glucose (sugar) in the blood. It is both a

symptom of diabetes and a condition that may lead to diabetes. The symptoms of hyperglycemia include unexplained weight loss, increased urination, and excessive thirst. It is diagnosed by a fasting blood test, that is, a test of glucose levels after you have not eaten for eight to twelve hours.

Hyperglycemia occurs if your pancreas does not make enough insulin to metabolize sugar or if your cells are unable to respond to insulin properly (insulin resistance). These situations cause a problem with glucose entering cells in your body, and cells require glucose to work properly and make energy for the body to use.

HIV itself may cause hyperglycemia. Protease inhibitors (PIs) are the main drug cause of hyperglycemia. Other risk factors include being overweight, having a family member with diabetes, and older age. It is more common among African-Americans.

You may be able to reverse hyperglycemia by switching to a medication regime that does not include a PI. In addition, hyperglycemia can be treated with medication.

Rashes

HAART can cause skin rashes that can be mild or, much less frequently, severe or even life-threatening. NNRTIs are the most frequent cause of rashes, and , in this class of drugs, Viramune generally causes the most severe rashes. Your doctor may modify your initial dosing schedule in order to reduce this problem. Women are particularly susceptible to Viramune-associated rashes.

Protease inhibitors (PIs), especially Agenerase (amprenavir) and Aptivus (tipranavir) may also cause rashes. Women on birth control pills and those allergic to sulfa drugs are the most likely to develop rashes while taking these medications.

NRTIs may also cause rashes. One of these drugs, Ziagen (abacavir), can cause a severe allergic response that manifests as a rash. These forms of rashes, referred to as Stevens-Johnson syndrome (SJS) or toxic epidermal necrolysis (TEN), are dangerous and potentially life-threatening. If you develop a rash while taking Diagen (abacavir), you should notify your doctor immediately or go to the emergency room. It is important that you never take Ziagen (abacavir) again. It should be noted that these syndromes are also caused by many commonly used non-HIV medications and are very rare. The symptoms of SJS and TEN include fever, blisters, headache, and malaise.

Liver damage

The medical term for liver damage is hepatotoxicity. This category includes a number of conditions, including hepatitis (inflammation of the liver), hepatic necrosis (death of liver cells), and hepatic steatosis (too much fat in the liver).

These conditions have many causes other than HIV, such as alcohol use and infections with other viruses. The term hepatitis is confusing: it refers to any inflammation of the liver but is used popularly to mean infection with viruses other than HIV (hepatitis A, B, and C).

Liver problems may initially cause no symptoms. The first signs can be detected by blood tests that show damage to the liver. These tests are ALT (alanine aminotransferase), AST (aspartate amonotransferase), and GGT (gammaglobulin glutamy-transferase).

In later stages, symptoms of liver disease include diarrhea, nausea, and vomiting; abdominal pain; and jaundice (yellowing of the skin and eyes). Your doctor may detect liver enlargement (hepatomegaly) on physical examination.

Liver damage is associated with the following antiretroviral medications:

- NRTIs, especially Zerit (stavudine), Videx (didanosine), and Retrovir (zidovudine)
- NNRTIs, especially Viramune (nevirapine)
- PIs, especially Norvir (ritonavir)

You are greater risk of liver problems if you are also pregnant, infected with hepatitis B or C, or a heavy user of alcohol and/or a number of other drugs.

Peripheral neuropathy

Peripheral neuropathy is the medical term for numbness, burning, or tingling in the hands and feet. It can also manifest as muscle weakness, severe sensitivity to touch, and loss of balance. It may be mild or severe enough to cause significant pain and interfere with functioning.

It appears to be caused by HIV itself and can be a side effect of NRTIs as well as a number of medications used to treat opportunistic infections. It is hypothesized that NRTIs may cause damage to the energy-producing machinery of certain cells; this is called mitochondrial toxicity and leads to damage of nerves. A number of medications and some behavioral changes can be used to reduce the symptoms.

Bone problems

Osteoporosis and osteopenia describe a loss of calcium that weakens bones and may increase the risk of fractures; osteoporosis is more severe. Osteonecrosis means “bone death” and is caused when blood supply to the bone is cut off. The symptoms of these diseases are back, neck, and other bone pain; stooped stature; and fractures. Other risk factors are being female, smoking, drinking, and low body weight. The diseases are diagnosed by bone density scans or MRI and can be treated with dietary changes (increased calcium), exercise, stopping smoking, and medication..

Lactic Acidosis

Nucleoside reverse transcriptase inhibitors (NRTIs) can cause the liver to have problems metabolizing a chemical called lactate. Very high levels of lactate can lead to a condition called lactic acidosis. This condition is rare but serious. It is more likely to occur among women and people who are overweight. The symptoms are nausea, vomiting, stomach pain, fatigue,

shortness of breath, cold hands or feet, and weight loss. If you have these symptoms, you should contact your doctor immediately.

Emotional reactions

Some people feel a sense of relief at starting medication because they are taking action against the virus. Some people feel upset because starting medication makes the illness seem more threatening to them, even if they have no symptoms. Most people have a complicated mixture of these and other reactions. If your mood or behavior changes at this time, it may be that you are reacting psychologically to the stress of beginning medication.

For some people, starting medication feels like reaching a new stage in HIV disease. You may associate starting medication with the onset of disease. This association may make you feel as if you are sicker than you really are. Taking antiretrovirals may be your first significant protracted action to fight the virus. Some people feel that taking medication is a constant reminder of their HIV infection and, for a period of time, worry more about getting sick.

Many people find themselves feeling angry when they begin to take medication. It is burdensome to remember medication, visit the doctor, pay for pills, and fill out insurance forms. You may feel it is very unfair that you have to worry and make sacrifices to protect your health when other people do not. Taking medication may also make you feel isolated or different from other people.

The negative psychological reaction to starting medication often fades within a few weeks as taking medication becomes part of your daily routine (and therefore less noticeable). It may be easier for you to manage the first few weeks if you remember that the physical and emotional reactions to taking medications will probably lessen.

Adherence

If you are on HAART, you must take medication on a daily basis. Some people take one pill a day; others, multiple pills. In either case, taking medication on a daily basis is difficult for almost everyone. Side effects make it hard to persevere. Taking more of a medication that makes you feel ill is the last thing anyone wants. Some medications need to be taken with food and others without. This can require juggling your eating schedule and thus may be inconvenient socially.

However, taking medication regularly and almost always on time is crucial with HAART. The main reason for medication not working is failure to adhere to the medication regime. A recent study showed that patients who missed more than 5% of their medication had an increased risk of treatment failure. If you are taking one pill a day, this means missing not more than one dose per month.[178] With some medications strict adherence is less important than with other combinations; nonetheless, you should attemt to adhere to the prescribed medication regime.

Taking medication regularly is partly a matter of habit; any chore like this needs to become part of your daily routine. Sometimes negative feelings about taking drugs may unconsciously lead you to forget. It is understandable that people push reminders of a frightening situation out of their minds. Some people prefer to use a watch beeper or a special pillbox with a beeper attached

to help remind them to take medication. Others feel that this makes their use of drugs too noticeable to others.

The main predictors of non-adherence are the simplicity and tolerability of the regime, how comfortable you are with taking pills in front of others, and your psychological state when you begin therapy. Depression and substance use are often related to difficulty in adhering to medication.

Some people find it helpful to temporarily enlist another person to give them general support and reminders about doses. Many people are best helped by others in the same situation. Being part of a group when you first start medication may help you get through successfully. Sometimes friends, acquaintances, or health care providers act as if taking medication and tolerating side effects is a simple proposition—for most people, it isn't. You deserve whatever help and encouragement you need to use medication consistently.

Treatment Interruption

At times, brief interruptions of treatment are necessary—for example, you may have surgery and not be able to take anything by mouth for a period of time. It is important to consult with your physicians about the best way to stop medication. In order to avoid resistance, all drugs need to be out of the body at the same time. Because some drugs (e.g. efavirenz, nevirapine) stay in the body longer than others, it is important to stop these drugs earlier than the others.

There has been much debate about people stopping medication for longer periods of time with the hope that this might be safe, that is, without a large decrease in CD4 cell count. Such periods are referred to as "drug holidays" or "STIs (structured treatment interruptions)." Although further research on structured treatment interruptions needs to be done, studies so far indicate that they may be dangerous. HIV experts do not currently recommend treatment interruptions outside of a carefully monitored clinical trial, and an HIV-infected person should not interrupt treatment without consultation with an experienced clinician.[179]

There are four reasons that some researchers thought structured treatment interruptions might be desirable:

- Treatment fatigue: difficulty in adhering to and/or living with the need to take daily medication.

- Structured treatment interruption might temporarily relieve the acute side effects of antiretroviral medication and/or potentially help reduce long-term side effects of medication.

- Some scientists theorized that structured treatment interruptions may be useful in causing changes to the individual's immune system that would help fight HIV. The hypothesis is that stopping medication may help the immune system fight HIV by increasing a type of T cell known as cytotoxic T-lymphocytes. Studies so far have not born out this hypothesis.

- Structured treatment interruptions may allow a change in the virus to a strain that is more susceptible to medication. When an individual discontinues medication, the virus reverts to what is known as "wild type." Such virus may be more sensitive to previously used medication. This would be useful to HIV infected people who are resistant to a number of drugs.

- The effects of antiretroviral drugs on a developing fetus are still unknown. Structured treatment interruptionss would allow pregnant women to discontinue medication during the first three months of pregnancy, when drugs are most likely to harm the fetus. There are no data on the effects of interrupting treatment on fetal development.

However, the largest study done so far, the SMART trial, seemed to demonstrate the opposite: patients who took structured treatment interruptions had a higher rate of illness and death. This was attributed to the finding that these patients also spent more time with increased immune suppression and uncontrolled replication of HIV. Other studies (PART, DART, TRIVICAN) have replicated these results. Additionally, subjects on treatment interruption had more incidence of serious cardiac, kidney, and liver disease. Structured treatment interruptions did not increase cytotoxic T-lymphocytes.[180,181,182]

Preliminary studies show that some patients who have been treated with many drugs and have multiple drug resistances may benefit from a treatment interruption before starting multi-drug "salvage" therapy, while others do not. The usefulness of STIs in such patients have not been established. Some patients in this category have had a marked decrease in CD4 cells during the STI and have developed opportunistic illnesses.

PREVENTION OF OPPORTUNISTIC ILLNESS

Serious illness and death associated with HIV disease have decreased due not only to antiretroviral treatment but also through improvement of treatment to prevent opportunistic illness. The word *prophylaxis* is used interchangeably with the word *prevention*; medications (or other methods) to prevent the development of an illness are referred to as *prophylactic treatment*.

Prophylaxis is better than waiting to treat acute disease: drugs are more effective when used earlier, side effects are less severe, and the immune system is spared the strain of active illness. Prophylaxis is referred to as "primary" if it is instituted to prevent a first episode of a particular OI. It is called "secondary" if it is intended to prevent a recurrence of a particular OI.

For example, *Pneumocystis jirovecii* (PCP) has been the major cause of sickness and death in the AIDS epidemic in the United States. Although almost everyone is infected with PCP early in life, the organism is harmless unless people become immune compromised. In immune-compromised people, the organism can cause a life-threatening pneumonia.

Prophylaxis aginst PCP is crucial. You can greatly reduce your chances of ever developing PCP if you receive the right kind of monitoring and treatment starting as soon as you know you are HIV-infected. It is very important to prevent PCP: although treatment for episodes of active PCP has improved, 5% to 10% of people still die during their first episode, and it is still the most common cause of HIV-related death in the U.S.

Successful prophylaxis has two components: determining when particular opportunistic infections are likely to occur in an immune-suppressed person; and then using appropriate medication to block these infections.

Most opportunistic infections are the result of the growth and spread of microorganisms that have been in the body many years. Monitoring through the use of screening tests can sometimes indicate which people are infected with which organisms and therefore at risk for active infections.

The development of opportunistic infections is highly dependent on the degree of immune suppression. The most common measure used to monitor HIV-related immune deficiency is the CD4 lymphocyte count. Opportunistic infections are rare in people with CD4 cell count above 200. As the CD4 cell count declines below 200, infections become more frequent.

Some prophylaxis should be started in the absence of any symptoms:

- Prophylaxis for tuberculosis should be started for all HIV positive people with a positive tuberculin skin test (TST) or with close contact with a person with active TB regardless of the TST.

- Prophylaxis for PCP should be started when CD4 cells are below 200. In certain circumstances, such as the presence of other OIs, a CD4 percentage lower than 14%, or a history of thrush (oral candidiasis), prophylaxis should be considered at a higher level of CD4 cells. It can be discontinued if, with antiretroviral treatment, CD4 cells rise above 200 for at least 3 months.

- Prophylaxis for histoplasmosis should be started when CD4 counts are below 100.

- Prophylaxis for MAC (*mycobacterium avium* complex) should be started if CD4 cells are below 50. It can be discontinued if no symptoms are present and CD4 cells rise over 100 for at least 3 months.

- Prophylaxis for toxoplasmosis should be started if there is a positive antibody for toxoplasma and CD4 cells are below 100. It can be discontinued after initial therapy is completed, no symptoms are present, and CD4 cells are greater than 200 for at least 3 months.

Other diseases require prophylactic treatment if an initial episode has occurred. These include cryptococcosis, histoplasmosis, coccidiomycosis, and cytomegalovirus retinitis. Discuss the criteria for stopping with your physician.[183] Recommendations differ for children and adolescents.

The need for prophylaxis also depends on which opportunistic infections are common in the area in which the patient lives. PCP is common in North America, Europe, and Australia. Tuberculosis is common in Africa, Asia, the Caribbean, and South America, as well as in poverty-stricken areas of the United States. Histoplasmosis is common in the Ohio-Mississippi river valley of North America, the Caribbean (including Puerto Rico), and in Central and South America. Coccidiomycosis is found in the southwest United States and in Los Angeles. It is therefore useful to give your doctor a history of where you have lived and traveled.

Prophylactic drugs should not produce dangerous or intolerably unpleasant short-term side effects. Specific side effects have to be balanced against the benefit of preventing particular opportunistic infections.

HIV TREATMENT ISSUES FOR WOMEN

Generally, the differences in progression of disease in women versus men appear to be due to sociological rather than biological factors. Although studies demonstrate faster progression of illness and shorter survival time in women, this appears to be related to poor access to care because of gender issues, particularly the greater poverty of women and the burden of childcare.

No gender-specific recommendations exist for screening women for opportunistic infections. Kaposi's sarcoma is the only AIDS-defining condition found less frequently in women. There are specific gynecological concerns for women with HIV. It is important for your gynecologist to be knowledgeable about HIV issues and/or to be in communication with your HIV physician.

HIV-infected women are more likely than non-infected women to be infected with HPV, the virus that causes cervical cancer. Therefore, HIV-positive women are more prone to cervical disorders that lead to cancer than are uninfected women. Expert clinicians have recently recommended that an initial exam include colposcopy (magnified visual inspection of the cervix) and cervical cytology (Pap smear), followed by a Pap smear every six months. Pap smears appear to be sensitive in HIV-infected women.

Vaginal candidiasis, which occurs frequently among all women, may be particularly severe and likely to recur in HIV-infected women. Herpes simplex may also be more difficult to treat. No differences in menstrual disorders have been seen between HIV-positive and HIV-negative women.

There is a lack of direct data about whether women and men respond to antiretroviral therapy differently, although generally it appears to be as effective for women as for men. Many more men have participated in clinical trials of antiretrovirals, and thus the recommendations have been based on men's response.

Women appear to have some increased problems with side effects. Since women are more susceptible than men to anemia and osteoporosis, medications that can contribute to these problems are of concern. Rashes and a condition called lactic acidosis seem to be more frequent in women.

Further study is needed to determine if factors such as lower mean body weight and lower hemoglobin level in women may contribute to increased toxicity. However, until more data are collected, women should continue to take the currently recommended doses of HIV medication.

HIV itself and some medications seem to cause menstrual ireegularities, primarily among women with low CD4 levels and high viral loads. Report any changes in your menstrual cycle to your doctor.

Some antiretrovirals interact with oral contraceptives:

- Aptivus (tipranavir), Kaletra (lopinavir/ritonavir), Prestiza (darunivir), Viracept (nelfinavir), and Viramune (nevirapine) lower the level of ethinyl-estradiol from oral contraceptives and thus make them less effective.

- Crixivan (indinavir), Sustiva (efavirenz), Reyataz (atazanavir), Lexiva (fosamprenavir), and Rescripto (delavardine) raise the level of ethinyl-estradiol from oral contraceptives to levels that may be higher than necessary.

If oral contraceptive use is not possible, it is important to use alternative means of contraception.

Pregnancy and Childbirth

People who are HIV-positive can have a low risk of having a child infected with HIV. You need to work with a provider who is expert in the various methods of reducing risk for all parties and who feels comfortable not imposing moral judgment on your choices. Most of the choices are costly, and only some health insurance policies cover them. There are no data that indicate that pregnancy is dangerous for most HIV-infected women.

If you are an HIV-positive woman, it is best that you have an undetectable viral load at the time of conception, and in the first three months of pregnancy you must be on medication that does not cause birth defects. However, if you become pregnant unexpectedly and plan to have the baby, you should speak with your doctor immediately and not stop any medication until doing so. Detailed recommendations are complicated and can be found at the site listed below.

If the potential father is HIV-positive, there are a number of ways to reduce the risk of infecting the mother and the baby. Again, it is best that you have an undetectable viral load. In vitro or in utero fertilization can further reduce the risk, as will having intercourse without a condom only during the woman's fertile days. Another significant reduction in risk can be achieved through a procedure known as sperm washing. A sperm sample is taken, and sperm are separated from seminal fluid with a centrifuge (a device that separates components of a liquid according to density). The sperm is then tested for HIV with a PCR test.[184]

Even after all of these procedures, there is no guarantee that HIV will not be transmitted to your partner or child—but the risk is very low.

For information regarding issues of pregnancy and childbirth, consult

National Institutes of Health AIDSinfo, "HIV during Pregnancy, Labor and Delivery, and After Birth," at www.aidsinfo.nih.gov/contentfiles/Perinatal_FS_en.pdf

National Institutes of Health AIDSinfo, "HIV during Pregnancy," at www.aidsinfo.nih.gov/contentfiles/HIVandPregnancy_FS_en.pdf

AIDSmeds, "Family Planning, Pregnancy, and HIV," at www.aidsmeds.com/articles/Pregnancy_4900.shtml

Bedford (MA) Research Foundation Clinical Laboratory's Special Program of Assisted Reproduction, at www.sementesting.org

In New York City, the Center for Women's Reproductive Care at Columbia University conducts IVF for serodiscordant couples. Call 646-756-8282,

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Further Information for HIV-infected People

The most significant factors in treatment of HIV disease are the prevention of opportunistic infections and the use of antiretroviral medication. However, other health care measures can make a significant difference in the course of illness and quality of life. This chapter will describe these steps: the importance of prompt and aggressive treatment of all symptoms; immunizations (including the crucial topic of immunization against hepatitis B); specialized gynecological care; and dental care.

In addition, this chapter will provide information about nutrition and food safety, the use of alcohol and other recreational drugs, and how to live safely with domestic animals. Many of the recommendations are general advice about staying healthy that apply to all people, HIV-infected or not. Some of the recommendations apply to HIV-positive people with impaired immune systems (a low CD4 count).

SEEK MEDICAL CARE PROMPTLY AND AGGRESSIVELY

Most people who are HIV-infected worry at some point about whether to contact their doctors if a new symptom appears. If you are generally healthy and your CD4 count is normal, you generally have no more reason for concern than a person who is not HIV-infected, and most symptoms do not constitute a medical emergency. However, it is always a good idea to let your doctor know about any new symptom that lasts more than forty-eight hours. If you find yourself debating whether to call your physician, go ahead and call. It is almost always better to err on the side of being too careful. If your T4 cell count is below 200, you should always err on the side of caution.

One highly respected HIV doctor in New York City put it this way: “Almost all disasters in HIV disease occur because people wait too long to call their doctor.”[185] Many people put off calling their doctors because they worry about being “hypochondriacs” or bothering their doctors. Many HIV doctors, on the other hand, seem to report the opposite problem: their patients wait too long to call them with problems. Very few people call their doctors too often; if you are afraid you are doing this, speak about it directly with your physician. If you are becoming too worried about minor symptoms, the solution is not to ignore all symptoms but to get help with your anxiety.

If your T4 cell count is below 200, you may still feel a strong impulse not to think about a new symptom. People feel that if something is wrong, even something minor, it could be the start of a larger problem. You may be afraid of developing symptoms that could lead to a diagnosis of AIDS. It is tempting for most people to say, “If I just wait a few days, this may go away and I won’t have to worry about it.”

Contacting your doctor to report a new problem takes work. Doctors are busy: you may have to make repeated calls and then wait for a return call. Not only is this inconvenient, but during this time your anxiety may increase. (Some doctors have assistants who can give preliminary advice on the phone; this is very helpful.)

There are very strong reasons to try to overcome the understandable impulse to avoid calling your doctor if a new problem occurs. Most symptoms will be minor and getting this reassurance from your physician will make you feel better. If you have pushed a worry out of mind, it can create anxiety even if you aren't thinking about it consciously. If the symptom requires treatment, it is better to get treatment promptly. Your goal is to stay as healthy as possible; curing infections and other problems as fast as possible will help maintain the proper functioning of your immune system.

If your T4 cell count is below 200, there is a possibility that the problem you are experiencing is a symptom of an opportunistic infection. If you do have an opportunistic infection, it is crucial that you receive treatment as soon as possible. Opportunistic infections are likely to respond better to treatment when the treatment occurs early in the course of the infection. Early treatment may help you avoid hospitalization; some problems can be treated on an outpatient basis if treatment begins early. More severe illness due to delayed treatment can lead to unnecessary suffering, weight loss, and multiple secondary medical problems. Sometimes early intervention in an opportunistic infection can be lifesaving.

This situation may be particularly difficult if you get your medical care through a clinic. Sometimes the only way to be evaluated between regular visits is to go to the emergency room, a time-consuming and often unpleasant activity. It may be difficult or impossible to get your clinic doctor on the telephone. It is extremely useful to establish contact with a nurse or other health care professional in the clinic in addition to your doctor. This person may be easier to reach and may advise you as to whether it is urgent that you see a doctor.

HIV and Health Insurance

Individual Health Insurance

Individual health insurance plans tend to be much more expensive than group policies for those with chronic medical conditions. Insurance companies can also require prescreening applications that include questions such as whether the applicant has ever had a positive HIV antibody test or received HIV treatment. The company may also require applicants to take an HIV test before their application is approved. In some areas, insurance companies routinely deny applications from people with HIV, and those that do provide individual coverage may charge prohibitively expensive premiums. However, some states, including New York, prohibit insurance companies that provide individual policies both from denying coverage to people with HIV and from charging people with HIV higher premiums.

Group Health Insurance

For most people with HIV or other chronic medical conditions, the most cost-effective health insurance coverage is generally with a group plan, usually through an employer. Federal law

requires companies that offer group health insurance plans to offer you the same coverage, regardless of any medical condition you have. Nonetheless, most of these plans can still postpone coverage for individuals that have **pre-existing conditions**. A pre-existing condition is any legally-permitted medical condition, which may include HIV and/or AIDS, fro which you have either been treated for or had treatment recommended for in the 6 months prior to enrollment. (In New York State, HIV infection does *not* legally qualify as a pre-existing condition.) These delays in coverage are called **pre-existing condition limitation periods**.

The pre-existing condition limitation period means that someone newly insured under a plan cannot use that plan *for treatment of the pre-existing condition* for a certain period of time, usually 12 months (the federal limit). Thus, if you have been diagnosed with HIV, live in a jurisdiction where HIV infection is a permitted pre-existing condition, and get a new job with a group health insurance plan, you would not be able to use the new policy for HIV treatment right away. However, you can reduce or eliminate this limitation period if you establish what is called **portability**. Portability can be established if you meet the following two criteria:

1. You have been continuously covered by another insurance plan (group or individual) for a period of time that equals the duration of the new plan's pre-existing condition limitation period.

2. The gap between your prior coverage and your new coverage is less than 63 days.

If you meet the second condition, your new insurer must credit you for the time you were previously covered. If this equals or exceeds the new plan's pre-existing condition limitation period, you will be able to use your new plan for treatment related to the condition right away. If the length of coverage is less than the limitation period, you will only have to wait out the remaining balance before making claims related to the pre-existing condition under your new plan. (If your new employer has a waiting period before new employees qualify for benefits, this time will also count toward the limitation period.) You should get a letter from your old insurer that includes the dates and type of coverage; you should then submit this letter to your new insurer to establish portability.

To give an example: You are HIV-positive, worked for Company A for nine months, and were insured under their group health insurance plan. You start a new job at Company B, which offers health insurance to its employees on their first day of work. Company B's plan has a 12 month pre-existing condition limitation. Because you were covered by A's insurance plan until you qualified for insurance at Company B, the gap between your coverage is 0 days. Therefore, Company B will credit you with 9 months you were previously insured, and you will only have to wait 3 months before making HIV-related claims under your new policy. Until this 3 month period is over, you should keep your old coverage so that you can still be reimbursed for HIV-related claims (see section on COBRA).

Note that plans can limit portability to similar classes of coverage. For example, if your old insurance plan did not cover hospitalization but your new plan does, the new plan can apply its limitation period to hospitalizations and deny reimbursement as it would for a pre-existing condition.

COBRA

Despite the 63-day grace period, it is highly recommended that HIV-positive people not have any gap in their health insurance coverage. Gaps may arise if your old plan is terminated before you qualify for HIV-related reimbursements under your new plan, or if your new employer has a waiting period (often 30, 60, or 90 days) before you qualify for their health insurance plan at all. You can avoid these gaps by electing to continue your old coverage under a federal law called **COBRA**. If your former employer has at least 20 employees, it is required to offer those that leave for any reason the option of continuing as part of the group health insurance plan for up to 18 months. (Some states, including New York, extend COBRA protections to companies with fewer than 20 employees.) However, you will have to pay for COBRA continuation coverage yourself. Employees are usually required to terminate COBRA coverage once they qualify for coverage under a new health insurance plan; however, if you will not have immediate portability (either due to a pre-existing condition or the company's waiting period for benefits), you can keep your COBRA coverage until the pre-existing condition limitation period in your new policy has expired. If you do not have an old plan to continue, interim coverage may be available through a state program like the AIDS Drug Assistance Program (ADAP).

Treatment with an HIV specialist is covered by the Columbia Student Medical Insurance Plan. The University offers the plan at two levels of coverage: Basic and Comprehensive. The Comprehensive Level of the Plan offers enhanced benefits for prescription drugs and other health care services, and is recommended for students who have chronic health conditions, including HIV. For more information on insurance options for HIV-positive Columbia students, contact GHAP at 212-854-6655 or the Insurance Office at 212-854-3286. More details about the Columbia Student Medical Insurance Plan can be found online at:

http://www.health.columbia.edu/docs/csmip/overview/index.html

The symptoms of HIV disease are often the same as the symptoms of common illnesses. HIV-infected people need some way to distinguish run-of-the-mill colds and flus from more serious illness. The following section lists symptoms severe enough that you should call your physician.

SOME SYMPTOMS THAT MAY REQUIRE MEDICAL EVALUATION

Symptom	Contact your doctor if…
Fever	Temperature is above 100.4°F for 48 hours or longer. Fever indicates underlying illness and is not dangerous in itself unless it is very high. Fever can be lowered with the use of drugs.
Weight loss	Unexplained loss of greater than 10% of your body weight. "Unexplained" means that there is no change of behavior that would logically have caused the weight loss (such as dieting, exercising a lot, or not eating because you are depressed or anxious or in love).
Headache	Headache is unusually severe ("worst headache ever"). Headache lasts much longer than past headaches.
Diarrhea	3 or 4 liquid bowel movements per day. Diarrhea is combined with increased frequency of defecation, stomach cramping, or loss of control of your bowels. Symptoms persist for more than a few days.
Change in stool	Blood or mucus is found in your stool.
Vaginal bleeding	If not during menstruation.

Nausea, vomiting, marked loss of appetite	Nausea or vomiting lasts for more than 1 day. Noticeable but unexplained loss of appetite.
Pain on swallowing	Pain lasts more than a few days. Pain may appear in middle of chest under breastbone (mediastinal pain).
Breathing (respiratory) symptoms	Shortness of breath goes on for more than a few days. Look out for unusual shortness of breath on exertion. If you can normally climb flights of stairs and you now notice that you must rest between flights, call your doctor.
Coughing	Dry, nonproductive (no mucus) cough that goes on for more than a few days.
Severe abdominal pain	Abdominal pain is accompanied by fever, particularly if you have a history of pelvic infection.
Persistent colds or sore throats	Cold or sore throat goes on for 3 weeks or more.
Night sweats	More than 1 episode of night sweats (pajamas and/or sheets drenched). A sweaty neck or scalp is not a night sweat.
Mental changes	Recent onset of confusion or memory loss.
Rashes	Rash over entire body. Localized rash lasts more than 2 days.
Muscle weakness	Muscle weakness or loss of functioning on one side of your body.
Change in vision	Blurred vision, blind spots, or increased floaters.
Fatigue	Unusual and unexplained fatigue for more than 3 weeks.
Vaginal itching or discharge	Symptoms are persistent or unresponsive to self-treatment.
White patches or sores in your mouth	These symptoms can often be treated easily, but may be a sign of decrease in your immune function.
Swollen lymph nodes	Nodes swell very rapidly, particularly if swelling occurs on only one side of the body.
Purplish or discolored area on the skin	Skin discolorations get darker rather than fading, get hard, or do not blanch when pressed.

Many of these symptoms can occur as a result of depression or anxiety: headache, diarrhea, shortness of breath, confusion, memory loss, nausea, pain, and weakness. If you are feeling very depressed or anxious, your symptoms may be related to these emotional states. However, there is no way to determine if this is the case except by careful medical evaluation of the symptoms. You may be undergoing severe stress and still have physical symptoms that require independent treatment. As doctors say, you must "rule out" physical causes rather than "rule in" psychological causes.

IMMUNIZATIONS

In developed countries almost everyone receives vaccinations (injections designed to stimulate a protective immune response). Most vaccinations are given to infants or children. Some familiar childhood vaccines are those used to prevent polio, measles, mumps, rubella, whooping cough (pertussis), and *Haemophilus influenza* type B (HIB). Other vaccines are usually given later in life to travelers who are going to countries in which a particular infectious disease is common. Examples of this are vaccines against cholera and yellow fever. Some injections that are given to children need to be repeated periodically for adults who are at risk. Examples of these are injections against typhoid, diphtheria, tetanus, and pertussis.

There are several questions to be answered about immunization for people who are HIV-

infected. Which vaccines are safe for people who are immune suppressed? Which are unsafe? What vaccines should HIV-infected people get that non-infected people do not routinely get?

HIV-infected people are at increased risk of several diseases for which vaccines are useful. HIV-infected people should be vaccinated against pneumococcal (bacterial) pneumonia at least once and should receive yearly influenza vaccinations (in the fall, before the flu season). These vaccinations are safe and recommended for all people with HIV infection.

There has been concern that because vaccines stimulate the immune system they might therefore provoke T4 cells to divide, making HIV infection worse. However, **no persistent increase of viral activity has been correlated with vaccination of HIV-infected people** in studies of use of vaccines so far and in observation of HIV-infected children who have received the measles, mumps, and rubella vaccines. The side effects of vaccines are largely limited to a sore arm at the site of the injection and sometimes transient fevers.

Immune responses to antigens (substances that provoke immune responses in the body) are not as robust in immunocompromised people as in others. However, in limited studies and in clinical practice, **HIV-infected patients generally respond with protective antibodies to most vaccines.** The ability to respond depends on the degree of immunosuppression. Asymptomatic HIV-infected people are more likely to have a protective response to vaccines than are symptomatic people. It seems possible that vaccines offering long-term protection should be given early in the course of HIV disease. Higher doses and more frequent boosters of some vaccines may be needed.

Hepatitis B vaccination is somewhat less effective in HIV-infected people. However, it is recommended for all HIV-infected people. Hepatitis A vaccination is also recommended and may be obtained in combination with hepatitis B vaccination.

Some vaccines are made from microorganisms that have been disrupted to the point that they cannot reproduce. Since they cannot reproduce, they cannot cause disease. Such vaccines are known as an **inactivated vaccines** or **killed vaccines.** Killed-virus vaccines are safe for HIV-infected people.

An **attenuated live vaccine** is made from a microorganism that can reproduce but that has been weakened (or attenuated) so that it cannot cause serious disease. Sometimes, attenuated live vaccines are contraindicated in HIV-infected people.

Antibodies (immunoglobulins) can be concentrated from donated blood and injected into those who need protection against certain infectious illnesses. This **passive immunization** provides quick but temporary protection. Once the injected antibodies are gone, there is no native immune response to make more (no activated T cells and no memory B cells for the appropriate antigens). The immunoglobulins used may contain many different antibodies (as in the familiar *gamma globulin* shots) or they may contain specific antibodies for specific purposes. For instance, specific passive immunization is given to people who have been exposed to the hepatitis A virus in order to help prevent or limit the development of the disease.

General vaccination tips:

- Do not get vaccinated if you have a moderate to high fever; it is safe to be vaccinated if you have a cold or a low-grade fever.

- Keep track of your record of vaccinations: write down what vaccination you got and on what date. Try to get a record of vaccinations you received as a child. Your mother or other family member or your former pediatrician may have such records.

- Vaccines should be administered by the recommended route (oral, intramuscular, subcutaneous) to increase efficacy and reduce side effects.

- If you wait longer than recommended to complete a series of immunizations and your immune system remains intact, it does not reduce final protective results and you do not need to start over or get extra doses. However, if you are HIV-infected, it is good to get protection as soon as possible. Your immune system may be declining, so it is best to finish a series of vaccinations in the recommended time. You cannot get doses closer together than recommended or it will reduce antibody response.

- Do not get immunized during the first three months of pregnancy. Avoid conceiving until at least three months after immunization.

As was mentioned earlier, it is recommended that all HIV-infected people be vaccinated against hepatitis A and B virus and bacterial pneumonia, as well as each year in November against influenza. Hepatis A vaccine is recommended for all men who have sex with men. It can be administered along with the hepatitis B vaccine and is beneficial for everyone.

The following chart summarizes information about immunizations given to HIV-infected adults.

NIH CHART OF RECOMMENDED IMMUNIZATIONS FOR ADULTS [186]

Vaccine	Associated Disease	Dosage	Comments and Warnings
Recommended for all HIV Positive Adults			
Hepatitis B Virus (HBV)	Hepatitis B	3 shots over 6 months	Recommended unless there is evidence of immunity or active hepatitis. Blood test to check for HBV antibody levels should be done after completion of immunization series. Additional shots may be necessary if antibody levels are too low.
Influenza	Flu	1 shot	Must be given every year. Only injectable flu vaccine should be given to those who are HIV positive. The nasal spray vaccine (FluMist/LAIV) should not be used.
Polysaccharide pneumococcal	Pneumonia	1 or 2 shots	Should be given soon after HIV diagnosis, unless vaccinated within the previous 5 years. If CD4 count is <200 when the vaccine is given, immunization should be repeated when CD4 counts is at least 200. Repeat one time after 5 years.
Tetanus and Diphtheria Toxoid (Td)	1. Lockjaw 2. Diphtheria	1 shot	Repeat every 10 years.
Tetanus, Diphtheria, and Pertussis (Tdap)	1. Lockjaw 2. Diphtheria 3. Pertussis	1 shot	Recommended for adults 64 years of age or younger and should be given in place of next Td booster. Can be given as soon as 2 years after last Td for persons in close contact with babies under 12 months and health care workers.

Recommended for some HIV Positive Adults			
Hepatitis A vaccine	Hepatitis A	2 shots over a 1 or 1.5 year period	Recommended for health care workers, men who have sex with men, injection drug users, people with chronic liver disease (including hepatitis B or C), hemophiliacs, and people traveling to certain parts of the world.
Hepatitis A/Hepatitis B combined vaccine (Twinrix)	1. Hepatitis A 2. Hepatitis B	3 shots over a 1 year period	Can be used in those who require both HAV and HBV immunization.
Haemophilus influenzae type B	Bacterial Meningitis	1 shot	HIV positive adults and their health care providers should discuss whether *Haemophilus influenzae* immunization is needed.
Human papillomavirus (HPV)	Human papillomavirus	3 shots over 6 months	Recommended for females ages 9-26. Not recommended to be given during pregnancy.
Measles, Mumps, and Rubella (MMR)	1. Measles 2. Mumps 3. Rubella (German Measles)	1 or 2 shots	People born before 1957 do not need to receive this vaccine. HIV positive adults with CD4 counts <200, a history of AIDS-defining illness, or clinical symptoms of HIV should not get the MMR vaccine. Each component can be given separately if needed to achieve adequate antibody levels.
Meningococcal	Bacterial meningitis	1 shot	Recommended for college students, military recruits, people who do not have a spleen, and people traveling to certain parts of the world.
Varicella	Chickenpox	2 shots over 4-8 weeks	People born before 1980 do not need to receive this vaccine. Recommended unless there Is evidence of immunity or CD4 count is 200 or below. Not recommended to be given during pregnancy.

For recommendations for children with HIV infection, see www.aidsinfo.nih.gov/other/2EssentialsforManagingHIV1ap.pdf

HEPATITIS B VACCINATION

Hepatitis B is a viral disease that can cause serious and even fatal damage to the liver. Vaccination is now available that can prevent infection with hepatitis B. People who are HIV-infected should be screened to see if they are also infected with hepatitis B: if so, they should be monitored (and possibly treated) for chronic infection; if not, they should be vaccinated against future infection. Hepatitis B screening and vaccination is recommended for HIV-infected people as well as anyone who is sexually active.

The vaccine is administered in a series of three injections in the arm. You will get an initial vaccination, one a month later, and one six months later. The timing does not have to be exact. There are few side effects—you may have a sore arm for a day. Completion of the hepatitis B vaccine series provides an effective level of immunity in approximately 90 percent of cases.

Before you are vaccinated, your health care provider may want to check your blood to see if you have ever had hepatitis B in the past (remember—you may have had hepatitis B without noticing it). If you have ever had hepatitis B, you have developed natural immunity, cannot be reinfected, and will not need the vaccine. The blood test determines if you've ever been infected by looking for evidence of your immune system's response to the hepatitis B virus (specifically, for

antibodies to hepatitis B).

These blood tests also tell you if you are a chronic carrier or have chronic hepatitis. The presence of viral fragments (hepatitis B *antigen*) for more than six months indicates that you are a chronic carrier and are capable of transmitting the virus to others. Further testing can be done to determine your level of infectivity (how likely you are to infect others).

If you are infected with HIV, it is particularly important to get vaccinated against hepatitis B, because acute hepatitis B often produces severe symptoms in those who are HIV-infected. Also, developing chronic hepatitis B is more likely if you are HIV-infected. HIV-infected persons who develop hepatitis B are at a 19 percent to 37 percent risk of becoming chronic hepatitis B carriers. The vaccine is somewhat less likely to "take"—that is, to provide an effective level of immunity—in those who are HIV-infected, but it is effective in the majority of cases. One study indicated that at least 75 percent of asymptomatic patients developed a protective response against hepatitis B.

Hepatitis B vaccine does not transmit HIV, so there is no reason for people to avoid hepatitis B vaccine out of fear of HIV infection or reinfection. Available hepatitis B vaccines include *Recombivax*, *Engerix,* and *Twinrix*. All are synthesized using recombinant DNA technology. Since they not made from human blood, there is no danger of contamination with HIV. *Twinrix* also vaccinates against hepatitis A.

DENTAL CARE

Because people with HIV disease have an increased incidence of problems with gums, it is important to take particularly good care of your teeth and gums. This means following routine dental hygiene (tooth brushing and flossing) and seeing your dentist regularly, at least once a year.

Unfortunately, this is not as easy as it sounds. Many people are limited in their ability to get adequate care because dental care is very expensive and is not covered under many insurance policies. If dental insurance is available to you through your job and you can afford it, it usually turns out to be a good bargain. If you do not have insurance and cannot pay for dental care out-of-pocket, check on what clinic resources are available to you at a medical center near you that has an affiliated dental school. Registering at a dental clinic can involve time and red tape. It is better not to wait until an emergency to become a registered patient at a dental clinic.

If you are in bad pain from a dental problem, cannot afford a private dentist, and are not a clinic patient, you can always go to an emergency room for dental care, although this is likely to be time-consuming and not very pleasant. Call the hospital before you go and make sure that it has a dental department.

An additional problem with dental care is discrimination, although this occurs infrequently at the time of this writing. Some dentists overtly refuse to treat HIV-infected patients. If this happens to you, consider calling your local AIDS organization for information about legal recourse. Dentists or technicians may also subtly discriminate, for instance in attitude. It is important to counter discrimination, but it is also important to get your health care (including dental care) in as comfortable a setting as possible. Few people feel comfortable confronting their dentists about a troubling attitude. The realistic option may be to switch to a dentist who is better informed about HIV disease.

Many people worry about whether to tell their dentists that they are HIV-infected. There is no need for you to do so in order to protect your dentist. Your dentist should be following routine infection-control measures such as wearing gloves and mask and sterilizing instruments. This protects both dentist and patient. If your dentist is not following these procedures you should find a new dentist.

On the other hand, there are some reasons to tell your dentist about your HIV infection. Many people feel uncomfortable keeping a part of their medical condition hidden from a provider. If you have not told your dentist, you have no way of predicting her or his reaction if you develop symptoms. Also, HIV-related problems are often manifested first in the mouth. A dentist who is aware of your HIV infection and knowledgeable about oral symptoms in HIV disease can be helpful to you.

In some big cities there are dental practices that welcome HIV-infected people and specialize in their care. Call your local AIDS organization or ask friends to get information about such dental practices.

NUTRITION AND FOOD SAFETY

Issues regarding nutrition vary widely in HIV-infected people depending on their state of health. The same well-balanced diet is recommended to asymptomatic HIV-infected people as to anyone else. People with more advanced HIV disease may need a special diet, often to control weight loss (and its various contributing factors) or to deal with side effects of medication.

Good nutrition should maintain *lean body mass* (muscle as opposed to fat) and should provide adequate vitamins and minerals. Malnutrition complicates the course of HIV disease. Therefore, early intervention to prevent malnutrition is important.

Some drugs used in the treatment of HIV disease may interact with certain nutrients. Whenever you start a new medication, ask your physician about any diet modifications that might be useful.

Learn about nutrition. The following websites provide reliable information:

http://www.thebody.com/content/living/art49361.html

http://www.tufts.edu/med/nutrition-infection/hiv/health.html

A balanced diet consists of varied foods with adequate calories, protein, vitamins, minerals, and fluids. It is possible to get good nutrition from either a vegetarian diet or one that contains meat. If you are HIV-infected, it is a good idea to learn the basics of good nutrition and try to modify your diet to conform.

Some people who have HIV disease believe that a special diet or dietary supplements may help maintain health. Use your judgment carefully when changing your diet. Any diet that limits the variety of foods eaten may make it harder to get complete nutrition. In addition, limited diets may contain some substances in harmful amounts.

Some of the special diets that have been tried seem to be harmful rather than helpful. A macrobiotic diet must be monitored very carefully to assure sufficient calories and protein. A very-high-fiber diet may lead to diarrhea. A yeast-free diet has shown no evidence of effectiveness and is very restrictive.

If you feel that a special diet may help you, you must approach this with the same rigor as any other experimental program. That is, you have to be sure you understand the pros and cons of the diet you are trying.

However, most physicians are not knowledgeable about nutrition. Consulting with a registered nutritionist may be a better idea. However, many nutritionists do not know much about HIV disease. The ideal consultant is a nutritionist who has specialized in counseling patients with HIV disease. You can ask your doctor or nearby AIDS organization for referrals. If you are hospitalized, you may be able to get a nutritional consultation at no extra fee.

Taking a daily vitamin pill is a good idea to make sure you are getting 100 percent of the Recommended Dietary Allowances (RDA) of **vitamins and minerals** as set by the Food and Nutrition Board of the National Academy of Sciences. It is safe to take up to two or three times more than the RDA of vitamins and minerals. Amounts higher than these may cause problems, particularly with vitamins A, D, E, and K. There is no information for or against taking moderate extra amounts of vitamin B_{12}; however, very large doses of fat-soluble vitamins (such as vitamin A) may cause inflammation of the liver. There is no evidence that very large amounts of vitamin or mineral supplements ("megadoses") are helpful in HIV disease. It is safe to take up to 200 grams per day of vitamin C (ascorbic acid). Higher doses of vitamin C may lead to gastrointestinal symptoms such as diarrhea.

Trace minerals in high doses can also be toxic. For example, zinc used ten times more than the RDA can lead to diarrhea, vomiting, reduced serum copper levels, and anemia. High levels of selenium can also cause cardiac problems.

Food safety is an important issue. HIV-infected people who are immunocompromised are particularly susceptible to infections from microorganisms in food. Infectious organisms include salmonella, campylobacter, *Listeria monocytogenes,* shigella, *Clostridium perfringens, Staphylococcus aureus,* and *Clostridium botulinum* (which causes botulism), as well as others. These infections occur more frequently and tend to be more severe and longer-lasting in people who are HIV-infected. For this reason, food safety precautions that help prevent infection are important for those with HIV disease.

Following are some essential food safety precautions:

- Do not eat raw meat, chicken, shellfish, or eggs. Examples are steak tartare, uncooked oysters or clams, and homemade mayonnaise or other dishes made with uncooked eggs. These foods are more likely to contain infectious organisms. Avoid undercooked meat, chicken, poultry, fish and shellfish, and eggs. The temperature of any meat, poultry, or fish should reach 165 to 212 degrees F.

- Be careful in food preparation not to contaminate cooked foods with raw meat, fish, or poultry. For example, do not cut cooked meat on a cutting board that you have used for raw meat. (Plastic cutting boards are easier to clean. After using a cutting board for preparing raw meat, clean it with diluted bleach.) If you are using a marinade in which meat has been placed raw, you can use the marinade as part of the finished product, but only if the marinade is also cooked.

- Thaw frozen meat in the refrigerator. Do not stuff chicken in advance.

- Fruits and vegetables are much less of a problem than meat, poultry, or fish. However, fruits and vegetables can contain bacteria. Wash all fruits and vegetables thoroughly. Buy fruits and vegetables with unbroken skins.

- Wash hands frequently when cooking and always after handling raw meat, chicken, or fish. Keep all utensils in contact with food clean.

- Keep hot foods hot (above 140 degrees F). Keep cold foods cold (below 40 degrees F). Reheat leftovers.

- Use packaged luncheon meats within three to five days after opening.

- All milk and milk products should be pasteurized. Make sure frozen foods you buy are frozen solid. Make sure refrigerated foods are cold.

- Do not keep leftovers too long. If you are in doubt, discard it.

- Be careful with food that may have been outside for a long time or carelessly prepared. This includes foods brought on picnics or purchased from street vendors.

SAFER SEX AND CONDOM USE GUIDELINES

It is never too late to begin protecting yourself against HIV. Even if you are HIV positive, exposure to other sexually transmitted infections may help to trigger illness. Follow the risk-reduction guidelines below in any future sexual encounter.

Safer sex in one sentence: use a condom for every episode of intercourse, from start to finish, whether vaginal or rectal.

Adapting to Risk Reduction

If you are HIV-infected, the primary way to protect sexual partners from infection is to use condoms and withdraw carefully every time you have intercourse. Limiting the number of your sexual partners is not precaution against infecting others with HIV or becoming reinfected yourself. Only use of condoms for intercourse prevents transmission.

The issue of **talking about safer sex with a partner** is a difficult one for people who are HIV-infected. When will you tell your prospective partner that you are HIV-infected? For most individuals, this raises both ethical and emotional challenges.

Some people feel that it is their partner's right to know about their HIV status prior to any sexual activity, no matter how safe. Others feel that if they are practicing safer sex, they have no particular need to disclose their HIV status. Still others feel that the need to disclose depends on the degree of risk in the activity they are practicing. It is important for you to think out in advance what you believe is right and wrong. Impulsivity followed by guilt is an uncomfortable choice.

You also need to think about how your disclosure will affect your relationship with a prospective sexual partner. It is true that you may be rejected by a partner if you disclose that you are HIV-positive, either because of fear of infection or fear of a relationship with an HIV-infected person. On the other hand, your partner may feel angry or misled if you do not disclose your status prior to the first contact. In addition, you are likely to become anxious about this issue if the relationship progresses and you have not told your partner of your status.

Strike a balance in your sexual behavior. Some HIV-infected people are so afraid of infecting others or of others' reaction to hearing they are HIV-infected that they give up sex or alternate abstinence with occasional impulsive episodes of high-risk sex. An extreme of behavior (anxious and fragile abstinence) may lead to a very high risk of infection. You need not give up your sex life, nor should you involve your partners or yourself in high-risk sexual activities. Many people have been practicing risk reduction for many years now. They report that although it was sometimes difficult at the beginning, they are now able to enjoy sex that is both safe and satisfying.

If your partner is also positive, you might be considering intercourse without condoms. There are two issues to consider in this discussion. First, if you and your partner are not in a monogamous relationship, unprotected intercourse increases the risk of either of you transmitting other STIs to the other; it is highly desirable that HIV-infected people not contract another STI.

If you are HIV-infected, an important question is whether you can be infected with a second and different strain of HIV. This is referred to as superinfection. Becoming infected with a second strain of virus may or may not have an adverse effect on an individual's health. If superinfection is likely and harmful, this would be a reason for two HIV-infected people to continue to use condoms for intercourse. If it is impossible or rare and/or not harmful, it would make the use of condoms less important for two HIV positive people having sexual intercourse. Superinfection

needs to be distinguished from coinfection (simultaneous infection with two strains of HIV at one time).

The answer to this question is not clear cut; however, research so far indicates that superinfection can occur, is unlikely and probably does not occur if the partners are being treated and the level of virus in the body is low.

Research on this topic is difficult and results have not been consistent. Several studies have shown no evidence of superinfection.[187,188,189,190] Other studies seem to provide evidence of superinfection, but no study has demonstrated any adverse effect.[191]

The bottom line is that it is probably not very risky (in terms of HIV-infection) for two HIV-infected people to have intercourse without a condom, but this has not been entirely proven. You should remember that likelihood of transmission of other sexually transmitted infections is increased if condoms are not used.

TRAVEL

Plan for emergency and routine health care. If you have significant health problems associated with HIV, you may want to make special plans when you travel. A pre-travel health assessment is useful. You may also want to consider having overseas health insurance. Work out in advance a plan to return home should it be necessary. For continuity of care, and for psychological and financial reasons, you may prefer to return home to get any major medical care (including hospitalization) even if such care is available in another location. Make sure that you bring enough money to purchase a flight or other rapid transportation home should it be needed.

Generally speaking, there are few purely medical reasons that restrict the travel of HIV-infected people both within the United States and internationally. However, travel may take extra planning, depending on the state of your health, the location to which you are traveling, and the length of time you will be away.

Most people who are HIV infected are asymptomatic. Only HIV-infected people with compromised immune systems (low CD4 count) need to take special care. Developed countries pose no greater risk of infectious disease than is found in the United States. Special planning needs to be done in advance for travel to developing countries where certain infectious diseases may be more common. Obviously, a very long trip requires making arrangements for routine health care and medication.

Certain countries have regulations that allow them to restrict the entry of HIV-infected travelers. Check on the rules that apply to the country to which you are traveling by calling the Washington, D.C., embassy or local consulate of the country to which you intend to travel. HIV-positive foreign nationals were previously banned from entering the United States without a waiver. This travel ban (first imposed in 1987 and made law in 1993) was repealed legislatively in July 2008, and the initial federal Department of Health and Human Services regulatory change was initiated in June 2009. However, the change will not take effect until extended commentary and approval procedures are completed, a process that could take several more months and has

not been completed at the time of this writing.

If you are asymptomatic (or have only minor symptoms) and your trip is of less than three months duration, you are very unlikely to need medical care while away from home. In most developed countries, you can obtain adequate emergency care. Most geographical locations are easy to return from if you develop more serious medical problems.

If you will be away from home for more than three months, or if you currently have major medical problems, ask your doctor for the name of an HIV-expert physician in the area you are visiting. If your doctor cannot help you with this, call a local AIDS organization in that area. If this is not possible, find out what the nearest major medical center is. If you think you might require major medical care, it is obviously best to travel only to areas where such care for HIV-infected people is available.

HIV-infected people face special risks of infectious disease when traveling to some countries. The presence or increased incidence of infectious disease in these countries may be due to tropical climate or to inadequate health care and poor sanitation secondary to poverty. Generally the risk is greater in Latin America, Africa, parts of the Middle East, the Indian subcontinent, parts of Asia, and Southeast Asia. However, travel to Western Europe, Australia, Japan, and Canada presents no additional risk to United States travelers. Epidemics of infectious diseases come and go in different areas. In order to find out about risk of infectious disease in a particular geographical area, you need up-to-date information. In addition to consulting your health care provider, go to the CDC International Travel Recommendations (http://www.cdc.gov/travel or 404-332-4559) for health information for travelers, including current areas of infectious disease and current vaccination requirements.

The most common diseases in travelers are caused by microorganisms in food and water contaminated with infected feces. Diseases caused by microorganisms that enter via the gastrointestinal tract are known as *enteric* infections. It is estimated that at least forty percent of travelers to developing countries suffer from enteric infections. In many of these developing countries, the indigenous population suffers chronically from these infections and lacks adequate resources for prevention and treatment, such as an uncontaminated water supply, sanitation facilities, refrigeration, medications, etc.

The most common symptom of these diseases is diarrhea, often referred to as "**traveler's diarrhea**." The symptoms of traveler's diarrhea are increased volume of unformed bowel movements, urgency, cramps, fever, malaise, and nausea. Traveler's diarrhea often has an abrupt onset and usually lasts for three to seven days, although it can be longer.

People with HIV disease are particularly vulnerable to many enteric infections and have an increased risk of developing severe forms of the illness. The most common enteric infections are *E. coli,* salmonellosis, campylobacteriosis, cryptosporidiosis, hepatitis A, and shigellosis. People with HIV disease have increased risk of developing serious symptoms with all these diseases, particularly campylobacteriosis, shigellosis, and salmonellosis. There are a number of other diseases caused by contaminated food and water, including poliomyelitis, cholera, and typhoid fever.

There are several strategies to control enteric infections. They include sanitary measures to avoid exposure to the infectious organisms, immunization, and prevention of illness through the use of antibiotics, antimicrobials, or immune globulins. Medications exist to prevent the development of some infections but not others.

Prevention is the best way to deal with the possibility of developing an infection while traveling. **Caution about food and water is the main method of prevention.** In poor, developing countries where sanitation and refrigeration are likely to be inadequate, follow the suggestions below.

- Do not drink tap water or use ice. Drink bottled water and use it for brushing your teeth. Soda, beer, wine, and hot tea or coffee made from boiled water are safe to drink. It is better to drink from a can or bottle than from a container that might have been washed with contaminated water. Wipe the outside of the bottle or can.

- If bottled water is not available, you can treat water. The best method is to boil it vigorously, then allow to cool. Do not use ice to cool boiled water. Chemical disinfection is also possible with either iodine or chlorine, preferably iodine. Tincture of iodine or iodine tablets are available from sporting goods stores and pharmacies. If the water remains cloudy after treatment, strain it through a clean cloth and use double the number of disinfectant tablets. Mechanical filters have not proven to be reliable.

- If you eat raw fruit or vegetables, eat only those that you have peeled yourself. Eat only thoroughly-cooked eggs, meat, and fish. Food that is steaming hot will be safe. Do not eat unpasteurized milk or dairy products. Do not eat prepared food from street vendors. Restaurant food that is cooked and still hot is generally safe.

If you are HIV-infected and traveling to a developing country where enteric infection is likely, discuss medication with your doctor. **Taking preventive medications such as ciprofloxacin may reduce the length and severity of symptoms secondary to travelers' diarrhea.**. You should get careful directions from your doctor on what to do if you develop diarrhea.

If you develop traveler's diarrhea**,** it is important to avoid further infection. Be even more careful about food and water precautions. It is also important to avoid dehydration by drinking plenty of fluids. Fruit juices and caffeine-free soda are ideal. Eat salted crackers to help you retain fluids. You should seek medical help if you have a fever over 102 degrees F, bloody diarrhea, dehydration, shaking, or any symptoms of long duration. Lomotil or Imodium can be used to control symptoms—but do not use them if you have a high fever or blood in your stools.

Hepatitis A is another disease transmitted by the fecal-oral route and is common in certain developing countries. HIV-infected people are no more susceptible to hepatitis A than are other people. Nevertheless, HIV-infected travelers can benefit from an injection with hepatitis A immune globulin (*passive immunization*). Passive immunization against hepatitis A is effective, has few side effects, and can prevent an uncomfortable illness that lasts several weeks. If you have not previously received the hepatitis A vaccine, you should consider being vaccinated if you are traveling to developing countries. The complete series is given as two shots six months apart. Completion of the two vaccinations confers long-lasting immunity against hepatitis A.

Other health measures for travelers:

- If you take a long trip on an airline, you may develop respiratory problems due to the very dry atmosphere on board. Ear infections or sinus problems may get worse due to changes in airplane cabin pressure at take-off and landing. It may help to use a decongestant or nasal spray.

- While on long airplane trips, get up and walk around if possible. This will help reduce the risk of blood clots that can form in the legs following long periods of inactivity.

- The flu season may be different in another geographical area. Check to see when you should get your influenza vaccination, if it is available.

- HIV-infected persons do not seem to develop particular problems with malaria, but any traveler who is going to an area where malaria is a danger should take medication to prevent the disease and take precautions against mosquitoes that spread the disease. Several drugs are used (for example, mefloquine, doxycycline, chloroquine). Your doctor or you should check on what type of medication is best to use. This depends on your destination since resistance to antimalarial drugs differs geographically. You can get this information from the Centers for Disease Control Malaria Hotline at 770-488-7788 or online at http://www.cdc.gov/malaria/travel/index.html.

- Using condoms for intercourse is crucial in all countries. Bring an adequate supply of condoms and lubricant regardless of your destination. Condoms may be in short supply or of inferior quality.

ALCOHOL

Many people who are HIV-infected use alcohol. Does this damage the immune system? Is it correlated with faster progression to AIDS? No studies answer these questions definitively. Consumption of large amounts of alcohol damages the body (including psychological damage). This has been proven in countless studies of non-HIV-infected people. Therefore, if you are HIV-infected and fighting to maintain the best health possible, you may further impair your health by drinking too much.

People with chronic active hepatitis should not drink alcohol at all. People taking ddI (didanosine; brand name Videx and Videx EC) should drink alcohol only in limited quantities because alcohol increases the risk of pancreatitis associated with this medication.

Alcohol dependence and abuse is extremely common in the United States; estimates are that 13 percent of the population either abuses or is dependent on alcohol. What is excessive use of alcohol? This is a difficult question to answer. It cannot be quantified simply by amount. For some people, even a relatively small amount of alcohol can cause adverse physical and psychological effects.

Here are some questions to ask yourself to help you figure out if you are using alcohol in a way

that is harmful to you.

- Have you ever had a blackout? (A blackout is a period of time when you were intoxicated and cannot remember what happened.)
- Have you ever been arrested for drunken driving or any other crime while under the influence of alcohol?
- Have you done anything you seriously regret when you were drinking?
- Have you ever been involved in violence while drunk?
- Have you had unsafe sex while drunk?
- Do you frequently fail to take prescribed medication when you have been drinking?
- Are you frequently hungover?
- Have you missed multiple days of work or school due to aftereffects of alcohol?
- Have you ever lost a job due to alcohol use?
- Have you ever lost a friend or lover due to alcohol use?
- Do you spend so much time drinking or recovering from being drunk that you have given up previously important social and recreational activities?
- Do you have any alcohol-related medical problems?
- Has use of alcohol caused you financial problems?
- Have you made unsuccessful efforts to cut back or eliminate alcohol use?
- Do you drink every time you feel anxious or depressed?
- Have other people complained about your drinking or told you that you drink too much?

If you answer yes to several of the above questions, seek further help in assessing a possible problem with alcohol. There is one important resource for alcohol problems that is available almost everywhere throughout the United States and in many other countries: Alcoholics Anonymous (AA). Even if you are not sure that you have a problem with alcohol, you can go to an AA meeting and learn more about the problem from people who are expert in alcohol problems—recovering alcoholics.

AA is a self-help group. It is free and anonymous. Although some people feel uncomfortable with certain aspects of the AA program, the fact remains that AA has been the single most successful program in helping people deal with alcohol problems. Almost every town has an AA chapter. If you live in a big city, you will have a choice of multiple AA groups. For

example, many cities have several gay AA groups. In addition, in New York, San Francisco, and Los Angeles, you can go to an AA meeting specifically intended for HIV-infected people. Call your local AIDS organization for information about these meetings.

Alcohol and drug information and resources at Columbia

Counseling and Psychological Services 212-864-4236

Alcoholics Anonymous

Contact numbers for Intergroup (information about AA meetings)

New York (212) 647-1680

San Francisco (415) 674-1821

Los Angeles (323) 936-4343

Most AA Intergroups have a website that includes a directory of area meetings.

Other drug and alcohol treatment resources in New York City

Roosevelt Hospital – Addiction Institute of New York 212- 523-6491

http://www.addictioninstituteny.org/

Realization Center (212) 627-9600

http://realizationcenternyc.com/

For other NYC resources see http://www.drugstrategies.org/Treatment/New-York/New-York/

OTHER RECREATIONAL DRUGS

Many other recreational drugs are used by people who are HIV-infected: cocaine, heroin, so-called designer drugs such as Ecstasy or Special K (ketamine), marijuana, tranquilizers (such as Valium and Librium), and sedatives or drugs intended for sleep, to name only a few. Methamphetamine (crystal, tina) is particularly dangerous. Crystal use often quickly leads to addiction, and its use is often associated with prolonged periods of physically unhealthy behavior, including missing medication, lack of sleep, dehydration, and intercourse without condoms. In the gay community, crystal use and sex parties have become common in the last few years. Many clinicians believe that this has become a major source of new HIV infections in the gay community.

Ask yourself the questions listed in the alcohol section, substituting the drug with which you are concerned.

In addition, ask the following questions.

- Am I sharing needles for drug use? Like intercourse without condoms, this puts you at risk of re-infection with new (and perhaps more dangerous) strains of HIV as well as other blood-borne diseases.

- Am I injecting drugs? Even when needles are not shared, this is an unhealthy practice because of the possibility of infection and because injection of drugs may activate the immune system, possibly promoting the progression of HIV disease.

- Am I facing the possibility of legal trouble because of the use of illegal substances?

- Am I missing doses of medication when I am using drugs?

- Am I having intercourse without protection while I am using drugs?

- Am I ignoring common-sense rules of healthy behavior (eating, sleeping, drinking adequate liquids) when I am using drugs?

Many people who use drugs are able to get help from going to 12 step meetings like Narcotics Anonymous (NA) or Crystal Meth Anonymous (CMA). For specific information, see what referral resources are available near you. Possibilities are an AIDS organization, a drug hotline, a state- or locally-run information service, the psychiatry department of a local hospital, or your doctor.

SMOKING TOBACCO

The information available about the effect of smoking tobacco on HIV disease is still somewhat ambiguous. Studies done so far on the effect of smoking on CD4 cell levels have produced contradictory results. However, tobacco has a multitude of bad effects on health. Many of the opportunistic infections in HIV disease affect the lungs. Your lungs will be in better shape and better able to resist damage caused by disease if you do not smoke. Additionally, there is some concern about the cardiovascular risk associated with HIV infection and HAART, and smoking is a well-documented cardiovascular risk factor. As the benefits of HAART outweigh the risks for most people with HIV, smoking cessation can be an important part of reducing cardiovascular risk.[192] A 2006 study of 900 HIV-positive women on HAART determined that smokers were 36% more likely to develop an AIDS-defining condition and 53% more likely to die during the five-year follow-up period. Poorer virological and immunological response to treatment, increased likelihood of viral load rebound, and lack of CD4 cell recovery were also associated with smoking.[193] If you are HIV-infected and trying to take the best possible care of your body, you may want to consider stopping smoking.

PETS

Some animals harbor organisms that are transmissible and may cause harm to people with HIV disease. For example, cat feces may contain *Toxoplasma gondii***.** Other animals that may spread harmful organisms are birds, turtles, and tropical fish.

This does not necessarily mean you have to give up your pet. Your veterinarian can determine whether your cat carries the toxoplasma parasite. Cats that have never been outdoors are less likely to be infected with toxoplasma. If you want to keep a toxoplasma-infected cat, have someone else clean out the litter box or wear gloves and a mask when you clean it. Wear gloves when cleaning a fish tank or handling fish, birds, or reptiles.[194]

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Appendix 1

Technical Details of Testing

Technical details of the EIA test

HIV from a laboratory source is grown in human white blood cells in a test tube. The resultant virus is chemically disrupted and then used to coat a small container or well. Serum (the cell-free portion of blood) from the person being tested is added to the coated well. If antibody to HIV is present, it will bind with the viral fragments lining the well. The serum is then washed away, leaving only the attached antibody behind. Another preparation is then added to the well. This preparation contains antibodies to human antibodies. These anti-antibodies have been chemically attached to an enzyme, and the anti-antibody-enzyme complex binds to the HIV antibody left in the well from the subject's serum. The well is then washed again to remove any material that has not bound to HIV antibody. Finally, a substance is added that produces a visible color change. This color change is then measured with a photometer (a device that measures the color of light reflected from the well). If the color change is over a preset threshold, the result is considered positive.

Technical details of the rapid test

Note: these details are for the OraQuick Advance HIV-1/2 Antibody Test used at Health Services at Columbia and GHAP.

The rapid test uses a single-use test kit consisting of a test device with immunoassay test strip and a developer solution. Oral fluid is collected using the flat pad of the test device, which is then inserted into the developer solution. Whole blood is collected via test tube and transferred to the developer solution vial, where the test strip is then inserted. The test strip contains a reagent that is rehydrated by the flow of the diluted specimen up the strip. The specimen then reaches the "T zone," where antigens are immobilized in the strip. If HIV antibodies are present in the specimen, they will react with the antigens and cause a line to appear on the strip. (Any line, no matter how faint, is enough to determine that the specimen is reactive.) The specimen then continues to flow up to the "C zone," which serves as a procedural control. If the test is valid (i.e., a specimen was introduced to the developer solution and it successfully flowed up the strip), a line will appear. Thus, all valid tests will have a C zone line, while all reactive specimens will have a second line in the T zone.

Technical details of the Western blot test

The Western blot is performed by exposing a specially prepared paper test strip to the blood sample. This strip is made in the following way. A quantity of HIV is grown in test tube cultures of human cells. The virus is isolated from the growth medium and disrupted into its component pieces. Each of these components is a molecule with a characteristic *molecular weight.* These components are then sorted by weight through a process called *gel electrophoresis.* In this

process, the solution of disrupted virus with the different component molecules mixed together is applied to one end of a sheet of polyacrylamide gel, a special porous material. An electric field is applied across the sheet, and this field accelerates molecules of different weights at different rates. At the end of a period of time, the mix of different components will separate into *bands* across the gel, with the lighter molecules at one end and the heavier molecules at the other. Each band contains molecules of a certain molecular weight—that is, each band contains only one kind of antigen. The gel is then blotted onto a sheet of paper, and this sheet is then cut into strips, each of which contains the full set of bands (complement of antigens). As with the EIA, the strip is exposed to the blood sample to allow any antibodies in the blood to react with the antigens in the strip. The strip is then washed so that any free unbound antibody is removed. Then the strip is exposed to a special antihuman globulin that binds to any human antibody. This antihuman globulin will combine with HIV antibodies that may have bound to bands in the test strip. The antihuman globulin is tagged with a normally colorless enzyme that reacts with a substrate to produce visibly colored bands wherever HIV antibody binds to the test strip. The intensity and location of these visible bands indicates the presence and relative proportion of the different antibodies that were present in the blood sample. The formal interpretation of the Western blot depends on which combinations of two or more bands are present in a particular sample.

Appendix 2

Symptoms of Acute HIV Infection

If you have had a high-risk encounter for HIV infection, the following symptoms are indicative of acute HIV infection:

Symptom	Percentage of patients who develop symptom
Fever	96%
Sore throat (pharyngitis)	74%
Rash (Usually a raised red rash on trunk and face)	70%
Joint pain (myalgia)	54%
Diarrhea	32%
Headache	32%
Nausea and vomiting	27%
Enlarged spleen (hepatosplenomegaly)	14%
Weight loss	13%
Thrush (a fungal infection of the mouth)	12%
Neurological symptoms	12%

From "Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents," Department of Health and Human Services/Kaiser Family Foundation, Jan. 29, 2008. Available at http://www.hivatis.org.

Appendix 3

The Mechanics of HIV

A virus consists of a protein shell (the capsid) surrounding genetic material (DNA or RNA). Viruses also contain enzymes (complex proteins that enable specific chemical reactions) and may have an enclosing fatty (lipid) membrane. Viruses cannot reproduce on their own – instead, they hide their genetic material in the DNA of the host cell. Thus, when the infected cell translates its DNA into proteins, it also copies the viral genetic material so new viruses are created.

A particle of HIV is encapsulated by a sugar-protein-lipid membrane (the viral envelope). On this envelope are two proteins, gp120 and gp41. gp120 binds to the CD4 receptor on a host T cell. Once gp120 and the CD4 protein are bound, gp120 also interacts with a chemokine receptor (a different receptor protein). This chemokine receptor, either CCR5 or CXCR4, serves as a coreceptor for HIV. (Some people have a mutation of the CCR5 gene known as CCR5- Δ32 that decreases the number of CCR5 proteins on the cell surface. Having fewer CCR5 coreceptors impairs the ability of HIV to infect cells and thus can substantially impact disease progression. The CC5R- Δ32 mutation is one proposed mechanism behind so-called "long-term nonprogressors.") After the binding of the surface gp120, CD4, and the chemokine coreceptor, gp41 can penetrate the host cell membrane. The subsequent interaction brings the viral envelope and host cell membrane close enough together to fuse, allowing the viral capsid to enter the host cell. Entry of HIV into the cell can be blocked by a class of drugs called entry inhibitors.

HIV is a type of virus called a retrovirus, or "reverse virus," a name that stems from the fact that retroviruses reverse part of the usual path by which genes make proteins. Retroviruses use RNA as their genetic material. In addition to RNA, the HIV capsid contains the enzymes reverse transcriptase/ribonucleic H, HIV integrase, and HIV protease. After fusion, each enzyme plays a key role in the subsequent replication of the virus. Reverse transcriptase forces the cell to copy the virus's RNA into double-stranded DNA (the reverse of the usual flow of information in the cell). Reverse transcription is highly error-prone, and the product DNA may have mutations that lead to drug resistance or a virus more able to evade the immune system. The process of reverse transcription can be blocked by nucleoside reverse transcriptase inhibitors and non-nucleoside reverse transcriptase inhibitors.

The new viral DNA then migrates to the host cell's nucleus . Here it is incorporated into the host cell's DNA by the viral enzyme integrase. Once integrated, the viral genome is known as a "provirus." When the host cell divides, the provirus is passively replicated and passed onto the daughter cells, which will also have proviruses in their genomes. Integration of the viral and host cell's genetic material can be blocked by integrase inhibitors.

Integration can lead to either latent or productive HIV infection of a cell. In latent infection, the virus is transcriptionally silent, that is, the provirus is passed onto daughter cells, but new virus is not produced. Latency explains how current antiretroviral drugs cannot eradicate HIV from the body: the proviruses form a reservoir that can allow a reemergence of HIV when immune function deteriorates. In productive HIV infection of a cell, the provirus is translated into genetic material called messenger RNA (mRNA). Some RNA strands are complete copies of HIV's genetic material, while others are split into pieces. The RNA is transported from the nucleus to the cytoplasm of the cell, where some split RNA strands are translated into strings of viral proteins. These proteins are then cut by the enzyme protease to form new copies of HIV's structural proteins and enzymes, including gp120 and gp41. All the new viral components then migrate to the cell membrane. gp41 anchors gp120 to the membrane of the host cell, while the other proteins and genomic RNA also associate with the membrane's inner surface. At this point, the new virion begins to bud from the host cell. As the virion matures, protease cleaves other precursor proteins into proper HIV components. At this point, the new virion is mature and can infect other cells. These stages of viral assembly can be blocked by protease inhibitors.

Appendix 4

Medication Guidelines for Treatment-Naïve Patients

Following is a slightly modified version of the Department of Health and Human Services guidelines for patients who have not previously taken antiviral medication.

NNRTI Options

Recommendations	NNRTI	When to avoid use or use with caution
Preferred NNRTI	Efavirenz This is the drug in this class that is most strongly recommended for first use effectiveness based on available evidence.	Do not use during the first three months of pregnancy or if you are likely to become pregnant. This medication can cause depression and other psychiatric problems. Prior psychiatric problems should be considered.
Alternative NNRTI	Nevirapine	Do not use if you have moderate to severe liver problems. Do not use if you are a woman who has T4 cells less than 250 prior to using antivirals. Do not use if you are a man who has T4 cells less than 400 prior to using antivirals.

PI Options

Recommendation	PI	When to avoid use or use with caution
Preferred PIs	Atazanivir + ritonavir-use daily This is one of three drugs in this class that is most strongly recommended for first use effectiveness based on available evidence.	• If you are taking high doses of certain medications for gastrointestinal problems, you should not use certain types of medications. These drugs are known as proton pump inhibitors and include the following medications: • Omeprazole (brand names: Losec, Prilosec, Zegerid, ocid, Lomac, Omepral, Omez) • Lansoprazole (brand names: Prevacid, Zoton, Inhibitol, Levant, Lupizole) • Dexlansoprazole (brand name: Kapidex) • Esomeprazole (brand names: Nexium, Esotrex) • Pantoprazole (brand names: Protonix, Somac, Pantoloc, Pantozol, Zurcal, Pan) • Rabeprazole (brand names: Rabecid) Your doctor will be cautious in using the above medications even if you are taking a moderate or low dose or if you are taking any antacids or medications for gastric reflux. These drugs are called H2 blockers and include: cimetidine (brand name: Tagamet), famotidine (brand name: Pepcid), nizatidine (brand name:Axid), ranitidine (Zantac), Tagamet-HB , Pepcid-AC, Axid AR, Zantac 75

	Darunivir This is one of three drugs in this class that is most strongly recommended for first use effectiveness based on available evidence.	
	Lopinavir/retonovir –once or twice daily This is one of three drugs in this class that is most strongly recommended for first use effectiveness based on available evidence.	Do not use once daily dose if you are pregnant.
	Fosamprenavir- twice daily	
Alternative PIs	Atazanavir alone (without retonavir)	Do not use in combination with tenofivir or didanosine/lamivudine
	Fosamprenavir + ritonavir-once daily *Or* Fasamprenavir without ritonavir-once daily	

Dual NRTI Options

Recommendations	2-NRTI	When to avoid use or use with caution
Preferred Dual NRTI	Tenofovir + emtricitabine This is the drug combination in this class that is most strongly recommended for first use effectiveness based on available evidence +emtricabine	Do not use if you are also taking atazanavir without ritonavir. Your doctor should be cautious about using this medication with nevirapine or if you have kidney problems.

Alternative Dual NRTI	Abacavir +lamivudine	Your doctor must do a special lab test (for a genetic marked called HLA-B*5701 to determine if you will respiond to this drug. Your doctor should be cautious about using this drug if your viral load is greater that 100,000 or if you have increased risk of cardiovascular disease.
	Didanosine + lamivudine or emtricitabine	Do not use with atazanavir unless you are also taking ritonavir. Do no use if you have had pancreatitis or peripheral neuropathy.
	Zidovudine + lamivudine	Your doctor should be cautious about using zidovudine if you have anemia (low red blood cells) or neutropenia (low white blood cells).