CHAPTER 7

Modes of HIV Transmission and Personal Risk Factors

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In previous chapters, we analyzed how the AIDS virus operates at the cellular level and at the organism level. Now our focus shifts to the interorganism level. In this chapter, we look specifically at the question of how HIV is transmitted from person to person. Because there currently is no cure for AIDS, once an individual has contracted the disease, preventing the transmission of HIV from person to person is critical. Consequently, in this chapter we consider risk factors for HIV transmission and discuss ways of reducing these risk factors.

The evidence for assigning risks to different levels of activities comes from two main sources: theoretical biological analysis and empirical epidemiological data, bolstered by laboratory data. Theoretical analysis considers the biological plausibility of HIV transmission for particular activities based on the presence or absence of substances containing HIV and of receptors for these substances. For example, we know that HIV is not present in someone's exhaled breath; consequently, on the basis of theoretical analysis alone, we would assign little risk to breathing the air in the same room with a person with AIDS. Theoretical analysis can be used to make predictions about no-, low-, or high-risk activities. These predictions ultimately can be tested by empirical epidemiological data, the other main source of evidence for our risk judgments in this chapter. To continue the example of transmission by breathing, epidemiological data from the sample of individuals who have lived with people with AIDS provide corroborating evidence that breathing the same air does not spread HIV (see Chapter 6, Table 6-3). Because epidemiological data indicate no AIDS incidence among family and friends who have simply lived with people with AIDS without intimate contact, and because of the biological implausibility, we can confidently state that breathing the same air is not a risk factor.

Typically, it is those activities with a high biological plausibility of HIV transmission that are carefully investigated with epidemiological studies. We saw one example of this in the last chapter. Anal receptive sexual activity has a high biological plausibility of HIV transmission, and the evidence from epidemiological studies discussed in Chapter 6 (Table 6-2) provides corroborative evidence that this behavior is, in fact, strongly associated with HIV infection.

In addition, epidemiological evidence can provide the initial evidence that certain activities are or are not associated with HIV infection risk. At the outset of the AIDS epidemic, for instance, it was epidemiological studies that led to the identification of likely modes of HIV transmission. This, in part, guided subsequent biological laboratory work, aided in the theoretical understanding of AIDS, and resulted in the isolation of HIV.

We should remember one aspect of epidemiological information at the outset of our discussion of risk and risk factors. Epidemiological studies, by their nature, identify groups of individuals with diseases, but it is wrong to conclude that there is something about the group itself that causes the disease. For instance, AIDS epidemiological studies have identified certain groups of individuals who are overrepresented in the population of those with AIDS, compared with their representation in the general population. These groups include homosexual and bisexual men and African American males. However, there is nothing about being homosexual or bisexual or an African American male that, by itself, leads to HIV infection and AIDS. Rather, some individuals in these groups are more likely to undertake certain *behaviors* that have a high biological plausibility of HIV transmission. Because of these higher HIV risk behaviors among some people in the group, the likelihood of transmission *averaged over the whole group* increases if the necessary and sufficient behaviors for HIV transmission occur. It is important to focus on the *behaviors* as the causal factor, not the group association.

Before we consider the risks of particular behaviors, however, we need to understand the biological bases of HIV transmission, including such issues as the primary sources of HIV within an infected person, the stability of the virus in moving between individuals, and the targets for infection in an uninfected individual.

Biological Bases of HIV Transmission

In infected people, infectious HIV is present only in cells and some human body fluids. Despite its devastating effects within the body, the virus is actually quite fragile in the external environment and dies quickly when exposed to room temperature and air conditions. In fact, very special laboratory conditions are needed to grow HIV outside the human body. It is important to remember this fact because it is easy to assume—mistakenly—that a disease as deadly as AIDS must be caused by an agent that is tremendously strong and sturdy. People's fears of the disease, combined with their lack of knowledge and mistaken impressions about epidemics, can cause them to view HIV in an anthropomorphic way—almost like a living, breathing enemy capable of thought and devastating action. The reality of HIV outside the body is much different: It is a fragile virus that loses infectivity quickly.

Sources of Infectious HIV

In an infected individual, HIV is present in particular cells and in some bodily fluids and secretions, many of which also contain these particular cells. In terms of cells, macrophages and T_{helper} lymphocytes are susceptible to infection by HIV, as described in Chapter 4. Macrophages may be the long-term reservoirs of HIV in infected individuals because they are not killed by the virus. Macrophages circulate through the bloodstream, and they also are found in all mucosal linings of the body, such as the internal urogenital surface of the vagina and penis and the lining of the anus, lungs, and throat. Another kind of cell that can be infected with HIV is the Langerhans cell, found on mucosal surfaces and below the surface of the skin.

Among people who test positive for HIV, the virus is not found consistently in all body fluids and products. Furthermore, in body fluids where HIV is regularly found, it occurs in different concentrations at different times. Nonetheless, we can place the body fluids and products into four groups based on the degree of association between body fluids/products and HIV infectivity. These groupings reflect differences among body fluids/products in their general concentrations of infectious HIV or HIV-infected cells and in the amount of relative exposure a typical individual might experience. Table 7-1 lists these groupings.

Table 7-1	**Degree of HIV Infectivity of Different Body Fluids and Products of Individuals Known to Be HIV Positive**
Group 1: *Very high infectivity**: Blood, semen, vaginal/cervical secretion (including menstrual fluid)	
Group 2: *High infectivity*: Breast milk	
Group 3: *Low infectivity*: Saliva, tears	
Group 4: *No infectivity*: Perspiration/sweat, urine, feces	

*The amount of infectious HIV in these fluids is particularly high in individuals during the initial (acute) phase of infection and in individuals with clinical AIDS.

Researchers have developed methods to test for HIV and estimate the amounts of infectious virus present in various body fluids and secretions. HIV can be isolated relatively easily from blood, semen, and vaginal/cervical secretions (including menstrual fluid). When blood and semen are examined closely, the great majority of HIV is associated with infected cells (mostly macrophages) present in these fluids. In blood, if the cells are removed, low levels of HIV are present in the cell-free serum. It has also been isolated from breast milk. With much greater difficulty, the virus has, on occasion, been isolated from saliva, tears, and urine. It has not been isolated from perspiration and feces. The current scientific view is that body fluids and products other than blood, semen, vaginal/cervical secretions, and breast milk contain so little, if any, HIV that they are not of major importance in HIV transmission between individuals.

The relative HIV infectivity of different body fluids and products can be explained in another way, using biological considerations. The fluids and products listed in Table 7-1 differ in the amount of live cells they contain. Blood, semen, vaginal/cervical secretions, and breast milk contain high numbers of live cells. The other body fluids and products (saliva, tears, perspiration, urine, and feces) are completely or nearly completely free of live cells (although they may contain nonhuman cells, such as bacteria). Because live infected cells produce HIV, we would expect fluids with live cells to have higher concentrations of HIV, and this is what many different studies of body fluids have shown.

Stability of HIV

For transmission of HIV infection to occur, infectious virus must survive long enough to pass to a susceptible person and infect target cells. In HIV, the virus particle (see Chapter 4) is actually a very fragile one, as discussed earlier. As a result, the virus quickly becomes inactivated when exposed to the drying effects of air or light. It is also quickly inactivated by contact with soap and water.

As mentioned, much of the infectious HIV is associated with cells (macrophages and T-lymphocytes). In blood or semen, cells maintain infectious HIV as long as they themselves are alive. Thus, intravenous transfusions of HIV-infected blood or sexual intercourse involving HIV-infected individuals efficiently transmits infection because live cells are passed. On the other hand, if blood or semen is allowed to dry, the cells die quickly, and the HIV infectivity is lost.

Targets for HIV Infection

At the cellular level, HIV infection requires the presence of virus receptors on the cell surface. As described in Chapter 4, the receptor for HIV is the CD4 surface protein, which is present only on T_{helper} lymphocytes, macrophages, and the Langerhans cells. Thus, these are the cells that could possibly become infected in an individual exposed to HIV. These cells are most abundant in the blood. Consequently, activities that introduce infectious HIV, either as infected cells or as free virus, into the blood of an uninfected individual have the potential to result in infection. For example, sexual intercourse can result in damage to or microscopic tears in the mucosal linings of the female genital tracts or the male or female rectum. These tears can allow passage of blood or semen into the circulatory system of the uninfected individual. In addition, as described previously, macrophages and Langerhans cells are also present at the mucosal surfaces of the rectum and genital tract, and they potentially can be infected directly without the necessity of virus entry into the bloodstream.

Other potential targets for HIV infection are the oral cavity and the throat. Like the genital tract and the rectum, the throat's mucosal lining contains macrophages and Langerhans cells. In certain sexual activities, such as oral sex, semen can be exchanged orally from one person to another. Consequently, there is the theoretical potential for infection. The epidemiological reality, however, is that oral sex is not a primary mode of transmission of HIV, as we shall see later. The explanation for this may be that there is less physical trauma associated with oral sex or that chemical and physiological features of the oral cavity reduce the efficiency of transmission. This case demonstrates the need to combine theoretical predictions from biology with epidemiological data about incidence rates to understand fully the risks of HIV transmission. It is this topic to which we now turn.

Modes of HIV Transmission

We are now ready to analyze the modes of HIV transmission from person to person and the relative risks associated with different modes. In making our assessment of risk, we rely on both the plausibility of HIV transmission, based on theoretical biological analysis, and the empirical facts associating documented HIV transmission with various modes, drawn from epidemiological studies. Together, these two sources of information permit us to categorize activities and behaviors according to the degree of their association with HIV infection.

Activities Not Associated with HIV Transmission: Casual Contact

Because HIV is so fragile outside the body, transmission requires direct contact of two substances: fluid containing infectious HIV from an infected person and susceptible cells (usually via the bloodstream) of another person. Because of the absence of this type of direct contact, a large group of interpersonal activities and behaviors, generally referred to as casual contact, have no measured association with HIV transmission (see Chapter 6, p. 109) and therefore pose no risk for HIV infection.

What do we mean by *casual contact*? Casual contact includes all types of ordinary, everyday, nonsexual contacts between and among people. Shaking hands, hugging, kissing, sharing eating utensils, sharing towels or napkins, using the same telephone, and using the same toilet seat are a few examples of casual contact. It is impossible to list all types of casual contact here, but you can analyze or make predictions about others, keeping in mind the need for direct contact with body fluids containing infectious HIV. For example, consider the possibilities of waterborne or airborne transmission. Because HIV is quickly inactivated outside the body, it cannot survive in the open air or in water. Consequently, we would predict that there is no risk in sharing the same physical space with a person with AIDS or in swimming in the same pool. Epidemiological evidence supports this conclusion: There is no measured risk of HIV transmission.

Activities Associated with HIV Transmission: Birth, Blood, and Sex

HIV transmission occurs when there is direct contact between HIV-tainted fluid from an infected person and the bloodstream or a mucosal lining of another person. Epidemiological data point to three modes of HIV transmission from person to person: via birth, via blood, or via sex. These are listed in Table 7-2 and discussed in the remainder of this chapter. For most people, the last mode of transmission—via sex—is the most likely, and we discuss it at length. First, however, we briefly discuss the other two modes.

Table 7-2	**Modes of HIV Transmission**
1. Birth: Perinatal transmission from an infected mother to her gestating infant.	
2. Blood: Transmission from an HIV-infected source to the bloodstream.	
3. Sex: Intimate sexual contact with an HIV-infected person.	

1. Birth: Perinatal Transmission from an Infected Mother to Her Gestating Infant

This mode of HIV transmission brings together a source of HIV (in the bloodstream of an HIV-infected woman) and a potential target (the bloodstream of a developing fetus) in a protected environment (the mother's womb). The mother's and child's bloodstreams are separated by the placenta, which prevents exchange of cells but not of nutrients. During the third trimester of pregnancy, however, small tears sometimes occur in the placenta, which can lead to entry of cells from the mother's bloodstream into the child's. In addition, during birth, the child frequently comes into close contact with or swallows the mother's cervical/vaginal secretions or blood due to the bleeding normally associated with delivery. Although reports vary, a good estimate is that there is about a 23% chance that a child of an infected mother will be infected if there is no antiviral treatment (see Chapter 5, p. 89). Intensive treatment, however, of the mother during pregnancy and delivery and of the infant during the first 6 weeks of life can reduce the transmission rate to 2%. Less intensive treatment, namely starting medications during labor, can even make a big difference, reducing the transmission rate from mother to infant to less than 10%.

2. Blood: Transmission from an HIV-Infected Source to the Bloodstream

This mode of transmission relates to receiving blood or blood products. It can occur in two main ways: by receiving a transfusion of HIV-infected blood or by injection with an HIV-contaminated syringe (either accidentally or incidentally).

Receiving a Transfusion of HIV-Infected Blood

Because a transfusion involves placing foreign blood or blood products directly into the recipient's bloodstream, the necessary conditions for HIV transmission are present: direct contact of potentially infected fluid with susceptible cells in the recipient. Before 1985, when screening of the blood supply for HIV by the antibody test was begun (see Chapter 4, p. 58), the sufficient condition for contracting AIDS was present: HIV-infected blood for transfusion. Even then, however, the risk was low that the blood or blood product involved in a transfusion was infected—except for hemophiliacs who required a clotting factor extracted from the blood of many different donors.

Now the situation is very different. All donations of blood and blood products in the United States are screened in three ways related to HIV: for HIV-1 antibodies, for HIV-2 antibodies, and for p24 antigens. All blood and blood products that test positive for these tests, or for any of about a half dozen other tests that are done (for diseases including hepatitis and syphilis), are discarded. These multiple screenings have greatly reduced the risk of HIV transmission but have not entirely eliminated it. Why is there still some risk? First, the screening tests and the people administering them are not perfect; errors can inadvertently occur. Second, and more likely, there is also a possibility that antibodies have not yet developed in a recently infected donor, so the tests could not detect these.

Blood donation centers have developed methods to reduce the risk even further (Figure 7-1). In addition to routine screening using the tests discussed in Chapter 4, pp. 58–61, centers have developed information campaigns that discourage blood donation from those who might be infected. Procedures also have been established to permit donors, particularly those who may feel pressured during a work-associated blood drive, to indicate confidentially that their blood should not be used. For example, the American Red Cross blood donation centers have used a special card describing a procedure that must be followed by all potential donors. The card lists nine groups of people who should not give blood and then describes a confidential procedure that all donors must follow, involving bar code labels indicating "transfuse" or "do not transfuse." People in one of the nine groups (e.g., drug users, men who have had sex with men since 1977) are to remove the "do not transfuse" bar code tag and place it on

Figure 7-1 A blood donor center. (© Keith Brofsky/Getty Images.)

another card. Those not in one of the listed groups remove the "transfuse" bar code tag and place it on the card. The bar code tags look identical to the casual observer but not to the optical scanner, which later identifies the blood to be rejected. With procedures like these, the risk of receiving infected blood or blood products from a transfusion has become even smaller.

Before we conclude this section, it is important to note three points. First, we have been analyzing the potential risks of receiving a blood transfusion, not of donating blood. There are no risks of HIV transmission from donating blood. The donor's blood is the only potential source of HIV in this situation: If there is no HIV in that blood, there is no other source of the virus. Second, receipt of an organ transplant is a possible source of HIV if the organ donor is HIV infected. Like blood donations, organ donations are tested for HIV, so the risk is quite small. Sperm donations also could be HIV infected and are screened for HIV. Third, the Red Cross's bar code program focuses on groups of individuals and thus risks making the error noted at the beginning of this chapter: focusing on groups that individuals are part of (and thus stereotyping) instead of on their behaviors (which are the important causal factors). Their instructions, however, focus the donor on his or her behaviors that might be associated with these groups, and they leave the final decision to the donor, who understands his or her actual risk-behavior situation best.

Injecting Oneself with HIV-Infected Blood

There are two ways in which HIV-contaminated blood in needles can lead to transmission: when needles are shared during injection drug use and through accidental needlesticks between an HIV-infected individual and a health worker. In both cases, someone with HIV-infected blood must be involved for there to be a source of HIV.

In the case of injection drug use, two necessary elements are present: a source of HIV-infected blood and the target of direct injection of that blood into the bloodstream. During the process of injecting the drug, an individual draws blood into the syringe to be sure that the needle is in a vein. Infected blood, therefore, can be mixed with the drug solution. If the syringe is then passed to another individual and inserted into his or her body, contaminated blood from the previous person can be passed into the bloodstream as part of the drug solution.

At first, this mode of transmission may appear contradictory in that HIV is removed from the body and isolated before being passed to another individual. This process occurs, however, in the special context of a protective container—the closed container of the syringe—where blood cells and virus are not exposed to the environment. In addition, it is generally done in a very short time, usually within seconds or, at most, minutes. Consequently, the blood cells remain alive and, with them, the HIV.

Prevention of this mode of transmission involves breaking the link between individuals via the syringe. Injection drug users are encouraged first not to share needles. Some cities provide free sterile needles so that limited syringe availability is not an issue, thereby reducing the chances for harm. Alternatively, injection drug users are encouraged to clean their needles between administrations, using a bleach solution.

The other mode of HIV infection is via accidental needlesticks by health workers. On occasion, health workers, in emergencies or in the process of medical laboratory work with HIV-infected people, have accidentally stuck themselves with potentially contaminated needles. There are a total of about 800,000 needlesticks in the United States every year from syringes, various intravenous needle assemblies, and blood-draw equipment; of these, about 16,000, or 2%, are with HIV-contaminated devices.

The risk of contracting HIV from a contaminated needlestick is about 1 in 200 (one-half of one percent, or 0.5%). Consequently, the risk that a healthcare worker will accidentally stick himself or herself with an HIV-contaminated needle and then develop HIV is 1 in 10,000 (one one-hundredth of one percent, or 0.01%). Administering antiretroviral drugs soon after exposure (between 2 and 36 hours) and then continuing the regimen for 4 weeks can reduce this small risk even further. Based on a Centers for Disease Control and Prevention study in 1995, the reduction in risk of infection may be as much as 81%.

To put these figures in a larger perspective, it is instructive to compare the transmission rates of HIV and the hepatitis B virus (a virus transmitted by similar routes as HIV) by needlestick injuries. The rate for transmission of HIV via a contaminated needlestick is approximately 0.5%. In contrast, the rate of transmission for hepatitis B virus via a contaminated needlestick is between 6% and 30%.

The greatest risk of HIV infection for healthcare workers is by an accidental needlestick, but, as the data presented here show, this risk is, in fact, quite low. Nonetheless, the risk does exist, as does the relatively greater risk of contracting other infectious diseases, such as hepatitis, via needlesticks. Consequently, during clinical procedures, health workers (who should also be wearing gloves) have been advised to discard used needles directly rather than recapping before discarding. In addition, new needles have been designed that make accidental sticks more difficult.

3. Sex: Intimate Sexual Contact with an HIV-Infected Person

For most people in the general public, this mode of transmission is the most likely source of HIV infection. The risk differs depending on the particular sexual practice, the frequency of the practice, and the HIV status of a sexual partner. We cannot, therefore, categorize particular sexual practices with certainty in terms of their HIV risk. The degree of risk of any particular sexual behavior differs from person to person. Individual risk assessment, however, is usually a difficult task, based on incomplete and sometimes unknowable data (e.g., the HIV status of a new sexual partner).

To make this task somewhat easier, we can discuss what we know from the theoretical and epidemiological perspectives. Together, the data from these perspectives complement each other and provide useful information for judging the relative risk of various sexual practices.

From the theoretical perspective, we know that we need two critical elements together: HIV-contaminated body fluid (in particular, blood, semen, or cervical/vaginal secretions) and direct contact of this fluid with a target site. The riskiest sexual practices, therefore, are those in which HIV-infected blood, semen, or cervical/vaginal secretions from an infected person come in immediate and direct contact with the bloodstream or mucous membranes of another person. These practices include vaginal intercourse between a man and a woman, anal intercourse between a man and a woman, and anal intercourse between two men. In all these practices, semen from the man is deposited into the vagina or rectum—both sites of HIV-target cells in macrophages and Langerhans cells and also sites where small tears frequently occur during intercourse, exposing the bloodstream.

At the other end of the spectrum, the least risky sexual practices are those where HIV-infected blood, semen, or cervical/vaginal secretions do not usually come into contact with target sites. These practices include masturbation by a male onto the unbroken skin of a partner and dry kissing (closed-mouth kissing). In the case of male masturbation, although a potential source of HIV is present in semen, a target site is not because unbroken skin does not present an HIV target. In the case of dry kissing, there is usually no source of HIV, since neither blood nor semen is generally present in the mouth, and the saliva of HIV-infected people has been shown to contain little or no HIV. With no source for HIV, there would be no risk.

On this spectrum of risk, we can anchor the ends of potentially risky sexual behaviors but cannot precisely anchor other groups of sexual practices or consider every possible case that could arise. For example, what if two people are dry kissing and one has a cut on the lip: Is there a risk of HIV infection? Or, what if a man masturbates onto chapped skin: Is there a risk of HIV infection? The answer to both questions is "possibly." Here is where the epidemiological evidence is useful.

We know that across groups of people, those who frequently engage in particular sexual practices are more likely to become HIV infected. The sexual practices listed here at the "riskiest" end of the spectrum of risk (vaginal intercourse with an HIV-infected person without a condom, anal intercourse with an HIV-infected person without a condom) have been shown, through epidemiological data, to be highly associated with HIV infection. The two practices from the "least risky" end of the spectrum (dry kissing and masturbation by an HIV-infected male onto the unbroken skin of a partner) have not been shown, through epidemiological data, to be associated with HIV infection.

Epidemiological data also provide clues to the relative infectivity of other sexual practices. Wet kissing (open-mouth kissing with exchange of saliva) has not been shown to be associated with HIV transmission. This makes sense from a biological perspective because we know that saliva of an HIV-infected person contains little, if any, HIV, so there is not a likely source of infection. Oral sex performed on an HIV-infected man or woman by either a woman or a man has not been strongly associated with HIV transmission, although there are some reported cases of transmission via this sexual practice. From a biological perspective, we can see why transmission might be possible, if HIV-infected semen is deposited in the mouth and throat or possibly into the bloodstream via small tears in the mouth. Nonetheless, there must be other chemical or physiological factors (e.g., the acidity of the mouth) that provide some barrier to HIV transmission because the epidemiological data do not show oral sex to be highly associated with HIV transmission.

From our analysis of the relative risk of various sexual practices based on biological and epidemiological considerations, we can both place the sexual practices on the spectrum of HIV risk and also see ways to reduce the risks of all sexual practices that could involve some risk. Abstinence from sexual relations clearly reduces the risk of transmission to zero: There is no source and no target. Because most people do not choose abstinence, another option is to have sexual relations of the least risky types. If they choose riskier sexual practices, they can reduce the risks by placing barriers between potential sources of HIV infection and potential targets. For example, they can use condoms during vaginal and anal intercourse to reduce the risk of HIV infection by containing potentially infected semen within the condom and preventing its contact with target sites in the vagina or rectum. Condom use during oral sex on a man also provides a barrier between potentially infectious semen and the target sites in the mouth and throat. During oral sex on a woman, a dental dam (a 3- to 4-inch square piece of latex) placed over the vagina also provides a barrier for source-to-target site contact.

These protective methods are not 100% effective. Condoms can have holes and can leak, although this is not at all frequent. Studies are regularly done on condom reliability, and condom manufacturers pay close attention to quality-control procedures. Putting on or using a condom in the wrong way can be another cause of ineffectiveness (for example, not rolling the condom completely to base of the penis). In fact, most studies indicate that condom misuse is a bigger cause of problems than are technical manufacturing issues. Consequently, improved knowledge and practice by condom users will result in very effective protection, not only of HIV transmission but also of pregnancy.

Properly used, therefore, condoms provide very good protection for most people. A condom should be fresh and made of latex (not of natural products). The condom must be placed on the man's erect penis before any penetration because preejaculatory fluid has been shown to contain HIV in an HIV-infected individual. Space should be left in the tip of the condom for the semen that will soon be ejaculated, and the condom should be unrolled completely to the base of the erect penis. If a lubricant is used during intercourse, it should be water based; grease- and oil-based products destroy latex.

Condoms or lubricants with nonoxynol-9, a spermicide, used to be recommended; recent studies, however, indicate that nonoxynol-9 does not kill the virus and may even cause irritation that could make HIV entry more likely. Consequently, condoms without nonoxynol-9 but with a water-based lubricant are now recommended. The condom must stay in place at the base of the penis until the penis is withdrawn from the vagina or rectum; this is best done before the man's erection fades and the penis is flaccid and separated from the stretched condom.

Each person must analyze his or her own sexual practices and take the precautions necessary for protection from HIV. The guidelines described in this chapter for self-protection are similar to those advocated by the U.S. Surgeon General, the U.S. Centers for Disease Control and Prevention, and many local AIDS prevention programs. The final decisions about individual risk assessment and management are made differently by each of us. Although we will never have all the data we need to make perfect decisions, we can use information from biological and epidemiological studies to assess the risks of various sexual practices. These assessments are best made before sexual activity, when our thinking is less affected by volatile emotions and judgment-confusing substances (alcohol or drugs), which are sometimes associated with sexual behavior for some people. Because sexual activity usually involves two people, it is necessary to think about HIV risk assessment and make decisions on HIV risk management together with your sexual partner before sexual activity. Then, those who choose to have sexual relations will be ready to enjoy the sexual experience more, knowing that they have taken the necessary precautions to lower the risk of HIV transmission.

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