



## **ROUTES, RISKS and REALITIES of HIV TRANSMISSION AND CARE: CURRENT SCIENTIFIC KNOWLEDGE AND MEDICAL TREATMENT<sup>1</sup>**

*Almost every type of HIV-related discrimination and associated stigma – from denials of medical treatment or admission to schools and camps to unwarranted felony prosecutions for HIV “exposure” – is rooted in gross misperceptions about the actual routes, risks and current realities of HIV transmission and treatment. Extraordinary progress in treatment options has transformed what it means to live with HIV, yet public understanding of HIV seems largely stuck in the 1980’s, before HIV was a treatable, chronic disease.*

*This fact sheet was created as part of a larger effort to replace that ignorance with information about what is currently well-known about how HIV is and is not transmitted, and how modern HIV care has transformed the health and longevity of people living with HIV while reducing transmission to others. We hope it will be useful for people with HIV and their advocates as well as policy makers and the press.*

**TRANSMISSION OF HIV – In general the rate of HIV transmission through the primary route of sexual contact is exceedingly low.** Modern HIV treatment substantially reduces the risk of transmission further.

- ❖ **HIV can only be transmitted three ways, through:** 1) blood and blood products, 2) intimate sexual contact (mucosal contact including penile-vaginal contact, penile-anal contact and rarely, if ever, by fellatio), or 3) vertical transmission (mother-to-child) during pregnancy, delivery or breast-feeding.
- ❖ **HIV is not transmitted by saliva, urine, vomit, biting or scratching.**
  - Contact with saliva, tears, or sweat has never been shown to result in HIV transmission.<sup>ii</sup> Being spit on cannot transmit HIV. There is no documented case of transmission from a person with HIV spitting on another person.<sup>iii</sup>
  - There are no documented cases of HIV transmission caused by contact with vomit, urine or feces.<sup>iv</sup>
  - Biting is not an established route of HIV transmission. There are numerous reports of bites that did not result in HIV infection. Bites that do not involve broken skin have no risk for HIV transmission, as intact skin acts as a barrier to HIV transmission.<sup>v</sup>
  - Getting scratched by a person with HIV will not cause transmission.<sup>vi</sup> There has never been a case of HIV transmission following a fight, boxing, karate, or similar form of contact.
- ❖ **Average risk of sexual transmission:<sup>vii</sup>**
  - **Anal intercourse**, of all sexual activity, poses the highest risk for transmitting HIV in the U.S. The rate of transmission for receptive anal sex *in the absence of antiretroviral drugs* is about 138 in every 10,000 incidents of unprotected receptive anal sex<sup>viii</sup>; but with the combination of effective condom use and antiretroviral treatment there is almost no transmission risk.<sup>ix</sup>
  - **Vaginal intercourse:** The transmission risk for unprotected receptive penile-vaginal intercourse is approximately eight in 10,000 sex acts, while the risk of transmission for unprotected insertive penile-vaginal intercourse is four in 10,000 events.<sup>x</sup>
  - **Oral intercourse:** The transmission risk for receptive and insertive oral sex, while biologically plausible, is very unlikely as demonstrated in studies finding no transmission.<sup>xi</sup> Fellatio (mouth to penis) is the only type of oral sex that carries more than a theoretical risk of HIV transmission, and only for the receptive partner. The risk for the insertive partner in fellatio is virtually nonexistent. *Note:* Cunnilingus (mouth to vulva/clitoris) and anilingus (mouth to anus) carry only a theoretical risk of transmission.<sup>xii</sup>
- ❖ **Factors that can modify individual transmission risk:**

The **risk of transmission of HIV from an infected person to an uninfected person varies** based on the 1) infectiousness (amount of virus present) of the source person and 2) the susceptibility of the recipient.

  - Infectiousness is determined by measuring the amount of virus in the blood and genital tract.<sup>xiii</sup> Risk of HIV transmission is low when the amount of HIV in the blood is low.<sup>xiv</sup> When the source person has acute

infection (i.e., the first few weeks after becoming infected) the amount of virus is very high and there is a corresponding increase in the risk of transmission.<sup>xv</sup>

- Virus levels can be very high in late stage untreated infection as well but usually considerably less high in the mid stage of infection.<sup>xvi</sup> Inflammatory STDs such as chlamydia and gonorrhea in the source patient can increase the amount of virus in the genital tract.<sup>xvii</sup>
- If either sexual partner has genital ulcers or inflammatory STDs the risk of HIV infection is increased. If an HIV positive man is uncircumcised, the risk of infection for the uninfected person is increased.
- A small subset of people who appear to be genetically less susceptible to HIV have a lower rate of infection than average.<sup>xviii</sup>
- Reductions of HIV in the genital fluids are typically proportional to the drop in HIV in the blood.<sup>xix</sup> However, detectable levels of HIV may remain in genital secretions even when levels in the blood are undetectable.<sup>xx</sup>
- Although the HIV transmission risk via fellatio is extremely small, the receptive partner’s risk is thought to be higher if he or she has bleeding gums or other abrasions in the mouth (but there is no definitive evidence on this).<sup>xxi</sup>

❖ **An individual is most infectious during the first 6 weeks after infection with HIV (“acute infection”).**<sup>xxii</sup> The time period between exposure and an antibody test’s ability to verify infection through standard oral or blood antibody testing may be as long as 6 weeks (the time it takes for the body to make enough antibodies to lead to a positive test result).<sup>xxiii</sup> During this phase of infection, extremely large numbers of copies of virus are present in the blood.<sup>xxiv</sup> Therefore, an individual’s infectiousness is at its peak during the time that standard antibody tests might not confirm infection if the person sought testing.<sup>xxv</sup> **Up to 50% of HIV transmissions occur during this acute infection stage.**<sup>xxvi</sup>

❖ **The probability of sexual transmission of HIV can be significantly reduced when the infected partner is prescribed and adherent to antiretroviral therapy (ART) and/or condoms are used.**<sup>xxvii</sup> Successful HIV treatment can reduce the viral load in the blood to undetectable levels, thereby reducing the risk of HIV transmission.<sup>xxviii</sup> A recent study also found that consistent use of condoms results in 80% reduction in HIV incidence.<sup>xxix</sup> Researchers estimate that effective use of ART treatment and condoms can reduce the already-low risk of HIV transmission by 99.2%.<sup>xxx</sup> In fact, in one recent study that followed 767 couples where one partner was infected but on therapy with an undetectable viral load, there were no transmissions despite condomless sex and an estimated 44,400 anal or vaginal sexual acts.<sup>xxxi</sup>

❖ **Living With HIV<sup>xxxii</sup> – HIV in the twenty-first century is a treatable and manageable disease, although it remains incurable, like viral STIs (e.g., human papillomavirus (HPV) and herpes).**

**When we talk about risk, we are talking about the risk of transmission of a manageable medical condition.**

- HIV medications and treatments have significantly changed the course of HIV.
- With daily medication – for most people, one pill per day --, regular laboratory monitoring, and lifestyle changes such as exercise, adequate sleep, and smoking cessation, HIV can be a manageable medical condition.<sup>xxxiii</sup>
- As of 2013, a 20 year-old with HIV who is on ART and living in the United States or Canada has a life expectancy into their early 70’s, a life expectancy that approaches that of an HIV-negative 20 year-old in the general population.<sup>xxxiv</sup>

<sup>i</sup> Excerpted in part from *HIV Medicine and Science: Transmission Considerations*, a 2014 slide presentation by Dr. David Wohl, Associate

<sup>ii</sup> *HIV and Its Transmission*, Ctrs. for Disease Control & Prevention (1999), available at: <http://hivlawandpolicy.org/resources/view/360>

<sup>iii</sup> *HIV Transmission* Ctrs. for Disease Control & Prevention (Jan. 16, 2015), available at <http://www.cdc.gov/hiv/basics/transmission.html>

<sup>iv</sup> *AIDS Center FAQs: How is HIV transmitted?*, University of Rochester Medical Center (Mar. 11, 2013), available at:

<http://www.urmc.rochester.edu/medicine/infectious-disease/patient-care/aids-center/faqs.cfm>.

<sup>v</sup> *Lack of Transmission of HIV Through Human Bites and Scratches*, Chris M. Tsoukas *et al.*, 1 J.A.I.D.S. 505 (1988). Available at:

<http://hivlawandpolicy.org/resources/view/576>; CTR. FOR DISEASE CONTROL & PREVENTION, *Estimated Per-Act Probability of Acquiring HIV from an Infected Source, by Exposure Act*, (July 11, 2013), available at <http://www.cdc.gov/hiv/policies/law/risk.html>.

<sup>vi</sup> *HIV Transmission* Ctrs. for Disease Control & Prevention (Jan. 16, 2015), available at <http://www.cdc.gov/hiv/basics/transmission.html>.

<sup>vii</sup> See also <http://www.aidsmap.com/Estimated-risk-per-exposure/page/1324038/>, which features the following table reflecting similar statistical risk estimates:

**Estimated HIV transmission risk per exposure for specific activities and events**

Activity	Risk-per-exposure
Vaginal sex, female-to-male, studies in high-income countries	0.04% (1:2380)

Vaginal sex, male-to-female, studies in high-income countries	0.08% (1:1234)
Vaginal sex, female-to-male, studies in low-income countries	0.38% (1:263)
Vaginal sex, male-to-female, studies in low-income countries	0.30% (1:333)
Vaginal sex, source partner is asymptomatic	0.07% (1:1428)
Vaginal sex, source partner has late-stage disease	0.55% (1:180)
Receptive anal sex amongst gay men, partner unknown status	0.27% (1:370)
Receptive anal sex amongst gay men, partner HIV positive	0.82% (1:123)
Receptive anal sex with condom, gay men, partner unknown status	0.18% (1:555)
Insertive anal sex, gay men, partner unknown status	0.06% (1:1666)
Insertive anal sex with condom, gay men, partner unknown status	0.04% (1:2500)
Receptive fellatio	0.00% to 0.04% (1:2500)

<sup>viii</sup> Pragna Patel et al, *Estimating Per-Act HIV Transmission Risk: A Systematic Review*, 28 AIDS 1509-1519 (2014), available at: <http://www.hivlawandpolicy.org/resources/estimating-act-hiv-transmission-risk-a-systematic-review-patel-et-al-lippincott-williams>.

<sup>ix</sup> Id. (“We estimate that used together, antiretroviral treatment and condom use could reduce HIV transmission by up to 99.2%”).

<sup>x</sup> Id.

<sup>xi</sup> Id.

<sup>xii</sup> Del Romero J et al. *Evaluating the risk of HIV transmission through unprotected orogenital sex*, 16 AIDS 1296-1297 (2002); *HIV Transmission Ctrs. for Disease Control & Prevention* (Jan. 16, 2015), available at <http://www.cdc.gov/hiv/basics/transmission.html>

<sup>xiii</sup> Pilcher CD, Eron JJ, Galvin S, Gay C, Cohen MS, *Acute HIV Revisited: New Opportunities for Treatment and Prevention*, 113 J CLIN INVEST. 937-945 (2004), available at: <http://www.jci.org/articles/view/21540/pdf>

<sup>xiv</sup> *HIV Transmission*, Ctrs. for Disease Control & Prevention (Jan. 16, 2015), available at <http://www.cdc.gov/hiv/basics/transmission.html>.

<sup>xv</sup> Pilcher CD, Eron JJ, Galvin S, Gay C, Cohen MS, *Acute HIV Revisited: New Opportunities for Treatment and Prevention*, 113 J CLIN INVEST. 937-945 (2004), available at: <http://www.jci.org/articles/view/21540/pdf>; see also Miller, WC, Rosenberg, NE, Rutstein, SE, Powers, KA., *The Role of Acute and Early HIV Infection in the Sexual Transmission of HIV*, 5 CURR. OPIN. HIV/AIDS 277–282 (JULY 2010), available at:

<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3130067/>

<sup>xvi</sup> Hollingsworth TD, Anderson RM, Fraser C., *HIV-1 Transmission, by Stage of Infection*, 198 J INFECT DIS. 687-693 (2008), available at: <http://jid.oxfordjournals.org/content/198/5/687.full>

<sup>xvii</sup> Wilson, J., *STIs: What Role Do They Play in HIV Transmission?*, CATIE (Spring 2012), available at: <http://www.catie.ca/en/pif/spring-2012/stis-what-role-do-they-play-hiv-transmission>

<sup>xviii</sup> Jannie J. van der Helm et al., *Characterization of Long-Term Non-Progression of HIV-1 Infection After Seroconversion: A Cohort Study*, THE LANCET - HIV e41-48 (2014), available at: [http://www.thelancet.com/journals/lanhiv/article/PIIS2352-3018\(14\)70016-5/abstract](http://www.thelancet.com/journals/lanhiv/article/PIIS2352-3018(14)70016-5/abstract) (Long-term non-progression of HIV-1 after seroconversion is approximately 18.4% after five years, 4% after ten years, and .3% after 20 years).

<sup>xix</sup> Kalichman SC, Di Berto G, Eaton L., *Human Immunodeficiency Virus Viral Load In Blood Plasma And Semen: Review And Implications Of Empirical Findings*, 35 SEX TRANS. DIS. 55-60 (2008).

<sup>xx</sup> *HIV Transmission*, Ctrs. for Disease Control & Prevention (Jan. 16, 2015). Available at <http://www.cdc.gov/hiv/basics/transmission.html>

<sup>xxi</sup> *HIV Transmission*, Ctrs. for Disease Control & Prevention (Jan. 16, 2015). Available at <http://www.cdc.gov/hiv/basics/transmission.html>.

<sup>xxii</sup> Pilcher CD, Tien HC, Enron JJ et al., *Brief but Efficient: Acute HIV Infection and the Sexual Transmission of HIV*, Quest Study and Duke-UNC Emory Acute HIV Consortium, 189 J INFECT DIS 1785-92 (2004), available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3130067/>

<sup>xxiii</sup> Id.

<sup>xxiv</sup> Id.

<sup>xxv</sup> Id.

<sup>xxvi</sup> Wawer MJ, Gray RH, Sewankambo N, et al., *Rates of HIV-1 Transmission Per Coital Act, By Stage of HIV-1 Infection in Rakai, Uganda*, 191 J. OF INFECTIOUS DISEASES. 403-409 (2005), available at: <http://www.ncbi.nlm.nih.gov/pubmed/15809897?dopt=Abstract>

<sup>xxvii</sup> Liu, H, Su Y, Lin Z, Xing J, Wu J, Wang N., *Effectiveness of ART and Condom Use for Prevention of Sexual HIV Transmission in Serodiscordant Couples: A Systematic Review and Meta-Analysis*, PLoS One. 4:9(11):e111175 (2014), available at: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0111175>

<sup>xxviii</sup> For example, the HPTN 052 study of heterosexual serodiscordant couples (where one is HIV+ and the other is HIV negative) found a 96% decrease in the risk of HIV transmission (comparing transmissions in study groups in which participants in one group started treatment earlier than those in the second group) when the HIV+ partner was on treatment. Cohen MS, Chen YQ, McCauley M et al., *Prevention of HIV-1 Infection with Early Antiretroviral Therapy*, 365 NEW ENG. J. OF MEDICINE 493-505 (Aug. 11, 2011), available at: <http://www.ncbi.nlm.nih.gov/pubmed/21767103>.

<sup>xxix</sup> Pragna Patel et al, *Estimating Per-Act HIV Transmission Risk: A Systematic Review*, 28 AIDS 1509-1519 (2014), available at: <http://www.hivlawandpolicy.org/resources/estimating-act-hiv-transmission-risk-a-systematic-review-patel-et-al-lippincott-williams>.

<sup>xxx</sup> Id.

<sup>xxxi</sup> A Roger, T. Bruun, V. Cambiano, J. Lundgren, et al., *HIV Transmission Risk Through Condomless Sex if HIV+ Partner On Suppressive ART: PARTNER Study*, Abstract 153LB, Conference on Retroviruses and Opportunistic Infections (CROI March 2014); see also <http://www.hivandhepatitis.com/hiv-prevention/hiv-test-treat/4553-croi-2014-no-one-with-undetectable-viral-load-transmits-hiv-in-partner-study>

<sup>xxxii</sup> This “Living with HIV” portion of the document is excerpted from a slide presentation by Allison Nichol, former Deputy Chief of the Disability Rights Section of the Civil Rights Division at the Department of Justice.

<sup>xxxiii</sup> <http://www.aids.gov/hiv-aids-basics/just-diagnosed-with-aids/overview/chronic-manageable-disease/>

<sup>xxxiv</sup> Hasina Samji et al., *Closing the Gap: Increases in Life Expectancy Among Treated Individuals in the United States and Canada*, PLOS ONE (Dec. 2013), available at <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0081355>.