A Sex-informed Framework for HIV Prevention

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Endowed Investigator
Disclosures

• Gilead Sciences donated study medication to US NIH for trials that I have led, including iPrEx, iPrEx OLE, and HPTN 067.

• Gilead Sciences contracted with San Francisco AIDS Foundation for phase 3 research on F/TAF PrEP.

• VIIV contracted with Gladstone to support phase II research on long-acting injectable PrEP.
Risk of HIV Transmission:
if no condoms, no PrEP, and no treatment, transmission per 10,000 sex acts

https://wwwn.cdc.gov/hivrisk/estimator.html#-~sb
CDC Estimates of Efficacy

Treatment >96%
PrEP for MSM >92%, heterosexuals 90%
Condoms 63% to 80%

https://wwwn.cdc.gov/hivrisk/estimator.html#-~sb
Editorial | Published 29 January 2016, doi:10.4414/smw.2016.14246
Cite this as: Swiss Med Wkly. 2016;146:w14246

HIV is not transmitted under fully suppressive therapy: The Swiss Statement – eight years later

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What has changed since 2008?

• HPTN 052
• Partners
• Opposites Attract
• PrEP clinical trials
• PrEP demo & real world studies
## Table 2. Characteristics of Eight Linked Partner Infections Diagnosed after the Index Participant Initiated ART.*

<table>
<thead>
<tr>
<th>Case</th>
<th>Age at ART Initiation</th>
<th>Index Viral Suppression 6 Mo after ART Initiation†</th>
<th>No. of Days before or after ART Initiation‡</th>
<th>No. of Days between Last Measure of Index Viral Load and Estimated Infection Date</th>
<th>Last Index Viral Load before Estimated Infection Date</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Index Participant Partner</td>
<td>ART Failure§</td>
<td>Partner's Last Negative HIV-1 Test</td>
<td>Partner's First Positive HIV-1 Test</td>
</tr>
<tr>
<td>A</td>
<td>43 yr</td>
<td>52 yr</td>
<td>Yes</td>
<td>NA</td>
<td>−35 yr</td>
</tr>
<tr>
<td>B</td>
<td>24 yr</td>
<td>24 yr</td>
<td>Yes</td>
<td>NA</td>
<td>−1 yr</td>
</tr>
<tr>
<td>C</td>
<td>50 yr</td>
<td>54 yr</td>
<td>Yes</td>
<td>NA</td>
<td>0 yr</td>
</tr>
<tr>
<td>D</td>
<td>34 yr</td>
<td>34 yr</td>
<td>No</td>
<td>261 yr</td>
<td>−42 yr</td>
</tr>
<tr>
<td>E</td>
<td>25 yr</td>
<td>29 yr</td>
<td>No</td>
<td>208 yr</td>
<td>1019 yr</td>
</tr>
<tr>
<td>F</td>
<td>30 yr</td>
<td>22 yr</td>
<td>Yes</td>
<td>441 yr</td>
<td>1617 yr</td>
</tr>
<tr>
<td>G</td>
<td>46 yr</td>
<td>26 yr</td>
<td>No</td>
<td>362 yr</td>
<td>2095 yr</td>
</tr>
<tr>
<td>H</td>
<td>28 yr</td>
<td>19 yr</td>
<td>No</td>
<td>891 yr</td>
<td>860 yr</td>
</tr>
</tbody>
</table>

Cohen et al, NEJM 375(9):830 2016
Sexual Activity Without Condoms and Risk of HIV Transmission in Serodifferent Couples When the HIV-Positive Partner Is Using Suppressive Antiretroviral Therapy

CONCLUSIONS AND RELEVANCE  Among serodifferent heterosexual and MSM couples in which the HIV-positive partner was using suppressive ART and who reported condomless sex, during median follow-up of 1.3 years per couple, there were no documented cases of within-couple HIV transmission (upper 95% confidence limit, 0.30/100 couple-years of follow-up). Additional longer-term follow-up is necessary to provide more precise estimates of risk.
Opposites Attract Study
HIV treatment prevents HIV transmission in male serodiscordant couples in Australia, Thailand and Brazil


<table>
<thead>
<tr>
<th></th>
<th>Linked transmissions (n)</th>
<th>Couple-years of follow up (CYFU)</th>
<th>CLAI acts (n)</th>
<th>Incidence per 100 CYFU (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>0</td>
<td>591.2</td>
<td>16,889</td>
<td>0 (0-0.62)</td>
</tr>
<tr>
<td>Any CLAI</td>
<td>0</td>
<td>318.0</td>
<td>16,889</td>
<td>0 (0-1.16)</td>
</tr>
<tr>
<td>Any CLAI, no daily PrEP</td>
<td>0</td>
<td>241.3</td>
<td>12,928</td>
<td>0 (0-1.53)</td>
</tr>
<tr>
<td>Insertive CLAI</td>
<td>0</td>
<td>210.0</td>
<td>8,389</td>
<td>0 (0-1.76)</td>
</tr>
<tr>
<td>Receptive CLAI</td>
<td>0</td>
<td>132.1</td>
<td>4,569</td>
<td>0 (0-2.79)</td>
</tr>
<tr>
<td>UVL (VL &lt;200)</td>
<td>0</td>
<td>236.2</td>
<td>12,638</td>
<td>0 (0-1.56)</td>
</tr>
<tr>
<td>VL &gt;200</td>
<td>0</td>
<td>5.17</td>
<td>290</td>
<td>0 (0-71.4)</td>
</tr>
<tr>
<td>STI diagnosed</td>
<td>0</td>
<td>23.2</td>
<td>1,007</td>
<td>0 (0-15.9)</td>
</tr>
<tr>
<td>First 6 months ART</td>
<td>0</td>
<td>10.0</td>
<td>341</td>
<td>0 (0-36.9)</td>
</tr>
</tbody>
</table>

[HIV incidence by category of CLAI]
When ART results in viral suppression, defined as less than 200 copies/ml or undetectable levels, it prevents sexual HIV transmission. Across three different studies, including thousands of couples and many thousand acts of sex without a condom or pre-exposure prophylaxis (PrEP), no HIV transmissions to an HIV-negative partner were observed when the HIV-positive person was virally suppressed. This means that people who take ART daily as prescribed and achieve and maintain an undetectable viral load have effectively no risk of sexually transmitted the virus to an HIV-negative partner.
HIV Incidence and Drug Concentrations

Follow-up %  26%  12%  21%  12%
Risk Reduction  44%  84%  100%  100%
95% CI  -31 to 77%  21 to 99%  86 to 100% (combined)

Grant WAC Melbourne 2014;
Grant et al, Lancet Infectious Diseases, published online July 22, 2014
New HIV Diagnoses in San Francisco

No change since 2012 in the proportion of PLWH virally suppressed at 65%

PrEP Users (est.): 400, 4,700, 12,500
Viral Suppression: 65%, 65%, 67%

Adapted from SF DPH, HIV Epidemiology Annual Report, Published September 2017.
Unequal Progress

Adapted from SF DPH, HIV Epidemiology Annual Report, Published September 2017.
achieve

Are Condoms Over?

Research and Reality for Gay Men
Overall STI incidence (90/100 person years) remained stable during follow-up (P>0.1)

Figure 7.3 Male rectal gonorrhea and male gonococcal proctitis among MSM by HIV serostatus, 2006-2016, San Francisco

Adapted from SF DPH, HIV Epidemiology Annual Report, Published September 2017.
Increased Testing and GC Diagnoses in London 2012 to 2016

Gonorrhoea tests and diagnoses in HIV negative MSM

PHE GUMCADv2 datasets from Dean Street 2012-16

McCormack IAS MOPL01 Paris 2017
PrEP would allow me to have sex without fear for the first time in my life. It would ... remove that month long hangover of psychological anguish after sex, worrying about whether or not I might have put myself at risk of HIV and looking for the slightest sign..... The entire gay community is affected by this kind of anguish and it only fuels the epidemic because when people feel anxious they don't talk about it.

Cal Stroud, 23
Quoted by Chris Godfrey,
The Independent,
August 4, 2015.
Belief in Future Value Fosters Safer Behavior and the Social Benefits of PrEP

<table>
<thead>
<tr>
<th>Future Value</th>
<th>Roles for PrEP and ART</th>
</tr>
</thead>
<tbody>
<tr>
<td>Future time orientation</td>
<td>Belief that one can stay free of HIV.</td>
</tr>
<tr>
<td>Future Planning</td>
<td>Fosters planning for sex events.</td>
</tr>
<tr>
<td>Present time pressure</td>
<td>Increased control over risk.</td>
</tr>
<tr>
<td>Present focus</td>
<td>Feeling safe, pleasure.</td>
</tr>
</tbody>
</table>

Cumulative Power of Choice

- PrEP
- HIV Exposure
- Treatment
- Condoms
Video link to the community talking about U=U