“Bending the Curve” of the HIV Epidemic: The Science Base

Anthony S. Fauci, M.D.
Director
National Institute of Allergy and Infectious Diseases
National Institutes of Health
October 14, 2014

Current Status of the Global HIV/AIDS Pandemic

- 78 million total HIV infections
- 39 million total AIDS deaths
- 35 million people living with HIV
- 1.5 million AIDS deaths in 2013
- 2.1 million new HIV infections in 2013

HIV in the United States

- 1.1 million people living with HIV infection, of whom 18% are unaware of their infection
- 636,000 people have died of AIDS
- Approximately 50,000 new infections/yr. for past two decades
- MSM, Blacks/African Americans face the most severe burden of HIV
- Youths aged 13-24 years account for >25% of new infections

HIV Diagnoses Among Persons Aged 13 Years or Older, by Year of Diagnosis, United States

HIV Diagnoses Among Persons Aged 13 Years or Older by Transmission Category and Year of Diagnosis, United States

Annual Number of HIV Diagnoses among MSM, United States, 2002 and 2011

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Change in Diagnoses</th>
<th>2002-2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 to 24</td>
<td></td>
<td>132.5%</td>
</tr>
<tr>
<td>25 to 34</td>
<td></td>
<td>-0.4%</td>
</tr>
<tr>
<td>35 to 44</td>
<td>-44.6%</td>
<td></td>
</tr>
<tr>
<td>45 to 54</td>
<td>5.3%</td>
<td></td>
</tr>
<tr>
<td>55+</td>
<td>18.6%</td>
<td></td>
</tr>
</tbody>
</table>
**Annual Number of HIV Diagnoses among MSM, New York State, 2002 and 2012**

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Change in Diagnoses</th>
</tr>
</thead>
<tbody>
<tr>
<td>13 to 19</td>
<td>-31%</td>
</tr>
<tr>
<td>20-24</td>
<td>214%</td>
</tr>
<tr>
<td>25-29</td>
<td>143%</td>
</tr>
<tr>
<td>30-39</td>
<td>-40%</td>
</tr>
<tr>
<td>40-49</td>
<td>-33%</td>
</tr>
<tr>
<td>50-59</td>
<td>8%</td>
</tr>
<tr>
<td>60+</td>
<td>-46%</td>
</tr>
</tbody>
</table>

Source: AIDS Institute, NY State Dept. of Health

---

**Bending the Curve: 3-Point New York Program**

- Identifying persons with HIV who remain undiagnosed and linking them to health care
- Retaining persons diagnosed with HIV in health care and getting them on anti-HIV therapy to maximize HIV virus suppression so they remain healthy, and to prevent further transmission
- Providing access to Pre-Exposure Prophylaxis (PrEP) for high-risk persons to keep them HIV negative

---

**AIDS**

HIV Transmission Rates from Persons Living with HIV who are Aware and Unaware of Their Infection

HI Hall, DR Holtgrave & C Maulsby

- In the United States, an estimated 49% of transmissions were from the 20% of persons living with HIV unaware of their infection

---

**FDA-Approved Antiretroviral Drugs**

<table>
<thead>
<tr>
<th>NRTI</th>
<th>Zidovudine</th>
<th>Didanosine</th>
</tr>
</thead>
<tbody>
<tr>
<td>NNRTI</td>
<td>Nevirapine</td>
<td>Efavirenz</td>
</tr>
<tr>
<td>PI</td>
<td>Saquinavir</td>
<td>Ritonavir</td>
</tr>
<tr>
<td>RTK</td>
<td>Cobicistat</td>
<td>Efavirenz</td>
</tr>
</tbody>
</table>

---

**Screening for HIV: U.S. Preventive Services Task Force Recommendation Statement**

U.S. Preventive Services Task Force

**Recommendation (Grade A):**

- Test all persons aged 15–65 years for HIV infection at least once, regardless of their risk; also test younger adolescents and older adults with increased risk.

- Persons with increased risk should be tested more frequently.
Dramatic Benefits of Viral Suppression with Antiretroviral Therapy

- Health and longevity of HIV+ individuals
- Reduced infectivity of HIV+ individuals

Dramatic Benefits of Viral Suppression with Antiretroviral Therapy

- Health and longevity of HIV+ individuals
- Reduced infectivity of HIV+ individuals

Closing the Gap: Increases in Life Expectancy among Treated HIV-Positive Individuals in the United States and Canada

H. Samji et al. for The North American AIDS Cohort Collaboration on Research and Design (NA-ACCORD) of IeDEA

- 22,937 individuals, 82,022 person-years
- A 20-year-old HIV-infected individual on ART in the U.S. or Canada is expected to live into their early 70s, a life expectancy approaching that of the general population

Prevention of HIV-1 Infection with Early Antiretroviral Therapy

HPTN 052 Study Team

- 1,763 HIV-serodiscordant couples in 9 countries
- 96% reduction in HIV transmission when ART started in HIV-infected partner at CD4 count of 350-550 compared to <250

Could HIV Treatment Mean Safer Sex?

'Do not happen, study finds'

- Increased condom use in meta-analysis of 27 studies of HIV+ people on ART
- "...treatment as prevention may be true in more ways than one."
**Adherence is Key to PrEP Efficacy**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Overall (%)</th>
<th>Drug compliant (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Truvada</td>
<td>44%</td>
<td></td>
</tr>
<tr>
<td>Tenofovir gel</td>
<td>39%</td>
<td></td>
</tr>
<tr>
<td>Oral Tenofovir</td>
<td>49%</td>
<td></td>
</tr>
</tbody>
</table>

*Detectable drug in plasma (IPrEx + Truvada) or >1000 ng/ml of drug in cervical/vaginal fluid (CAPRISA 004)*


**No HIV Infections with High PrEP Adherence in Partners PrEP Substudy**

- Very high adherence with active adherence monitoring counseling
- 14 infections, all in placebo group
- PrEP efficacy = 100% (95% CI: 84-100%)

1,147 uninfected partners in HIV sero-discordant, heterosexual couples in Uganda

**iPrEx Open Label Extension (OLE) Study: Adherence Must be Good, not Necessarily Perfect**

- Risk reduction 84% (95% CI: 21 to 99%) with 2-3 tablets/week
- Risk reduction 100% (95% CI: 86 to 100%) with ≥4 tablets/week

1,603 HIV-negative patients previously enrolled in 3 PrEP trials
PrEP Use Not Associated with Sexual Risk Compensation in Follow-Up to Partners PrEP, iPrEx Studies

No Evidence of Sexual Risk Compensation in the iPrEx Trial of Daily Oral HIV Preexposure Prophylaxis

Long-Acting Integrase Inhibitor Protects Macaques from Intrarectal Simian/Human Immunodeficiency Virus

Monthly injection of long-acting integrase inhibitor protected 100% of macaques from infection

Single shot protected 5-10 weeks

Transformation of HIV from Pandemic to Low-Endemic Levels: a Public Health Approach to Combination Prevention

HIV risk is not uniformly distributed: countries often have microepidemics with very different levels of transmission and risk groups/behaviors

HIV prevention efforts should focus on high-transmission geographies and populations -- “hot zones” -- and provide tailored packages of interventions

New HIV Diagnoses by County, United States, 2008-2011

HIV/AIDS in New York State: Bending the Curve Toward Zero

Rates of Persons Living with an HIV Diagnosis, by County, New York, 2010