# Clinical Update: Screening and Treatment of HIV Disease HIV and Women

**Satellite Conference and Live Webcast**
**Wednesday, March 3, 2010**
**2:00 - 4:00 p.m. Central Time**

**Produced by the Alabama Department of Public Health**
**Video Communications and Distance Learning Division**

## Faculty

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**Department of Medicine**
**Division of Infectious Diseases**

## Disclosures

- **I have no real or perceived vested interests that relate to this presentation nor do I have any relationships with pharmaceutical companies, biomedical device manufacturers, and/or other corporations whose products or services are related to pertinent therapeutic areas**

## Objectives

- **Identify the magnitude of HIV Infection by age, gender, and geographic distribution**
- **Understand the utility of opt-out HIV testing for HIV screening practice**
- **Increase knowledge in the prevention of maternal to child transmission of HIV in the US (MTCT)**

## Objectives

- **Increase knowledge of effective contraceptive options for women with HIV**

## Global Summary of the AIDS Epidemic, Dec. 2007

| | | |
|---|---|---|
| **Number of people living with HIV in 2007** | | |
| | Total | 33 million [30 – 36 million] |
| | Adults | 30.8 million [28.2 – 34.0 million] |
| | Women | 15.5 million [14.2 – 16.9million] |
| | Children under 15 years | 2.0 million [1.9 – 2.3 million] |
| **People newly infected with HIV in 2007** | | |
| | Total | 2.7 million [2.2 – 3.2 million] |
| | Adults | 2.3 million [1.9 – 2.8 million] |
| | Children under 15 years | 370 000 [330 000 – 410 000] |
| **AIDS deaths in 2007** | | |
| | Total | 2.0 million [1.8 – 2.3 million] |
| | Adults | 1.8 million [1.6 – 2.1 million] |
| | Children under 15 years | 270 000 [250 000 – 290 000] |

## HIV
## Human Immunodeficiency Virus

- Blood-borne, sexually transmissible virus
- Retrovirus
  - Retroviridae family, *Lentivirus* genus
- Infects CD4 T-Cells, dendritic cells and macrophages
- Depletion of Host's CD4 Cells and cell mediated immunity

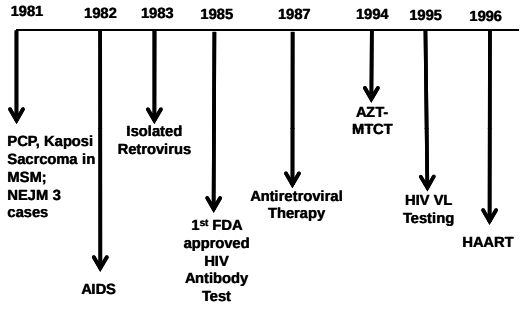
## HIV
## Human Immunodeficiency Virus

- 2 Species of HIV
  - HIV-1 & HIV-2
    - Subtypes/Clades
    - B Clade Predominates

## HIV
## Human Immunodeficiency Virus

- HIV-1
  - Slightly more easily transmitted
  - Shorter asymptomatic period
  - Higher viral load/faster decline in CD4 count
  - Higher rates of genital tract shedding, MTCT and sexual transmission

## History of HIV




## AIDS: Acquired Immunodeficiency Syndrome

- CD4 ct ≤ 200 cells/mm$^3$
- Decreased cell mediated immunity
- Increased susceptibility of opportunistic infections

## Stages of HIV Infection

- Viral transmission
- Acute HIV infection
- Seroconversion
- Clinical latent period with or without persistent generalized lymphadenopathy (PGL)
- Early symptomatic HIV infection

## Stages of HIV Infection

- AIDS
  - CD4 cell count ≤ 200/mm$^3$
- Advanced HIV infection
  - CD4 cell count < 50/mm$^3$

## HIV Transmission

- HIV acquisition risk
  - Exposure to contaminated blood or bodily fluids
- US
  - At the beginning of male-to-male (MSM) sexual contact & injection drug use (IDU) accounted for about 50% of cases
  - Subsequently, the epidemiology has varied

## HIV Transmission

- In resource limited areas
  - 70-80% of AIDS cases attributed to vaginal sex
  - 5-10% of AIDS cases attributed to perinatal transmission
  - 5-10% of AIDS cases attributed IDU

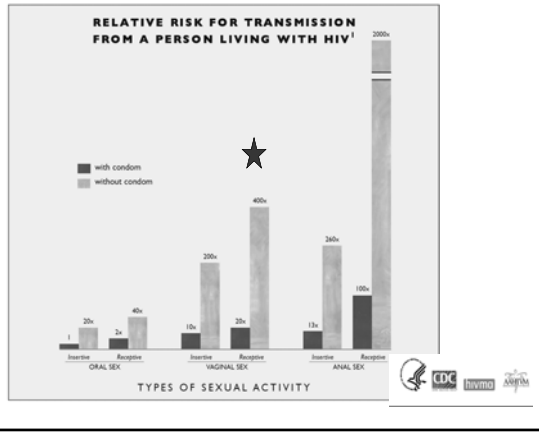
## Risk Factors for HIV Acquisition

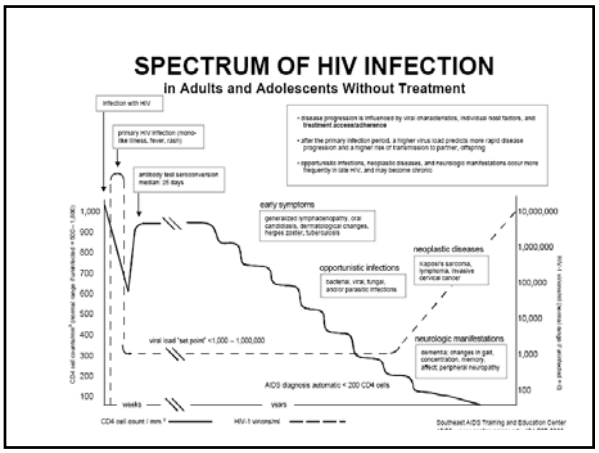
- HIV viral load
- Presence of sexually transmitted disease
- Type of sexual activity
- Sexual behaviors
- Lack of male circumcision
- Genetic background

**TABLE 1. Estimated per-act risk for acquisition of HIV, by exposure route***

| Exposure route | Risk per 10,000 exposures to an infected source | Reference |
|---|---|---|
| Blood transfusion | 9,000 | 74 |
| Needle-sharing injection-drug use | 67 | 75 |
| Receptive anal intercourse | 50 | 76, 77 |
| Percutaneous needle stick | 30 | 78 |
| Receptive penile-vaginal intercourse | 10 | 76, 77, 79 |
| Insertive anal intercourse | 6.5 | 76, 77 |
| Insertive penile-vaginal intercourse | 5 | 76, 77 |
| Receptive oral intercourse | 1 | 77† |
| Insertive oral intercourse | 0.5 | 77† |

*Estimates of risk for transmission from sexual exposures assume no condom use.
†Source refers to oral intercourse performed on a man.






## Stages of HIV Infection

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## Stages of HIV Infection

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  - CD4 cell count ≤ 200/mm$^3$
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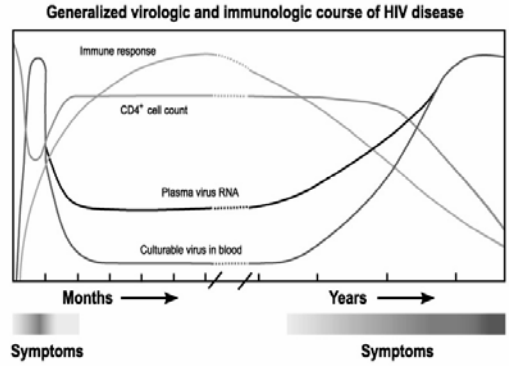
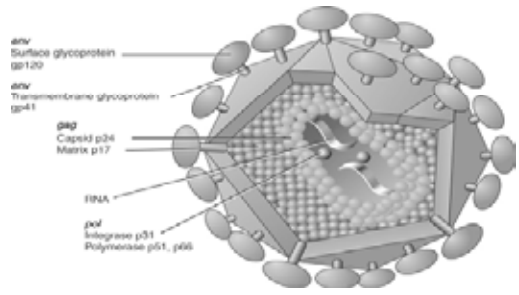



## Schematic of HIV-1 Viral Elements Useful for Establishing a Diagnosis of HIV Infection



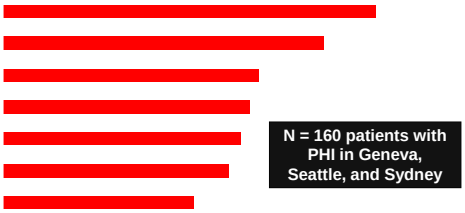

**Frequency of common symptoms of acute HIV infection**

| Symptom(s) | Frequency, percent |
|---|---|
| Fever | 80 |
| Lymphadenopathy, pharyngitis, rash, myalgia/arthralgia, headache | 40-80 |
| Oral ulcers, genital ulcers, nausea/vomiting, diarrhea | 10-40 |

*Reproduced with permission from: Taiwo, BO, Hicks, CB. Primary Human Immunodeficiency Virus. Southern Medical Journal 2002; 95:1312. Copyright ©2002 Lippincott Williams & Wilkins.*

UpToDate

## Primary HIV Infection: Common Signs & Symptoms



N = 160 patients with PHI in Geneva, Seattle, and Sydney

% of patients

## Primary HIV Infection: Other Signs & Symptoms

% of patients

## Oral Ulcers in Acute HIV Infection

## Clinical Manifestations of Primary HIV Infection

## Clinical Manifestations of Primary HIV Infection


## Primary HIV Infection and Public Health

- **Public health**
  - **Patients with primary HIV infection are likely to be highly infectious**
  - **Antiretroviral therapy (ART) during primary HIV infection may alter the natural course of HIV disease**

## Primary HIV Infection and Public Health

- Should we treatment primary HIV infection?
  - Suppress initial burst of viremia
  - ? alter viral set-point
  - Decrease viral evolution
  - Preserve CD4 lymphocytes (both absolute number and HIV-specific)
  - Potentially decrease risk of transmission

## Stages of HIV Infection

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## Stages of HIV Infection

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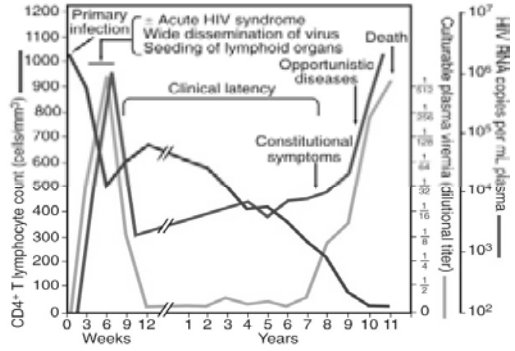
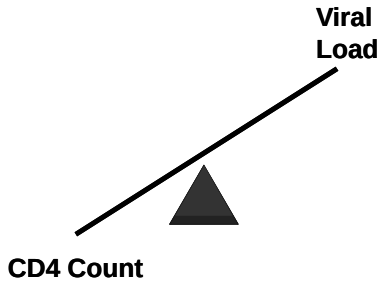
  - CD4 cell count < 50/mm$^3$



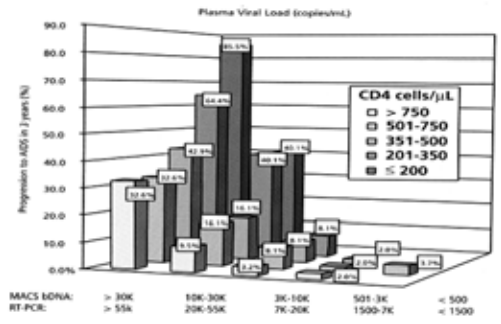

## Progression of HIV

- Clinical progression
- Average CD4 decline
  - 50-70 cells/year
  - Likelihood of progression depends on viral load

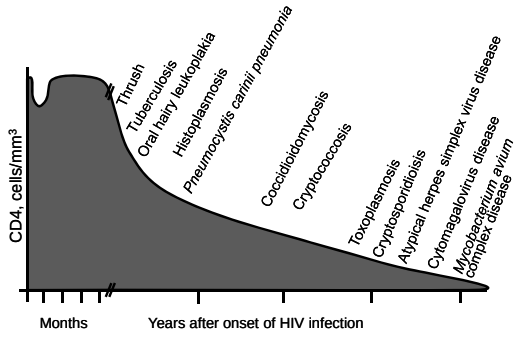
## Progression of HIV



## Likelihood of Developing AIDS Within 3 Years




## Natural History of HIV Infection




## Objectives

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- **Increase knowledge of challenges in preventing maternal to child transmission of HIV in the US (MTCT)**
- **Increase knowledge of effective contraceptive options for women with HIV**

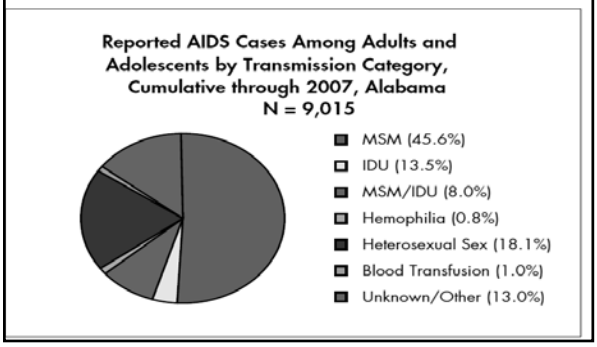
## HIV/AIDS: Where Are We Now?

- **HIV incidence**
  - **# new HIV infections in a specific population/ a specific period of time**
- **HIV prevalence**
  - **# of people living with HIV/AIDS in a given year**

## HIV/AIDS: Where Are We Now?

- **Nationally**
  - **2006 incidence estimate: 56,300 people**
  - **2006 prevalence estimate: 1.1 million persons**
  - **2007 estimated number of persons diagnosed with AIDS: 37,041**

## HIV/AIDS: Where Are We Now Locally?



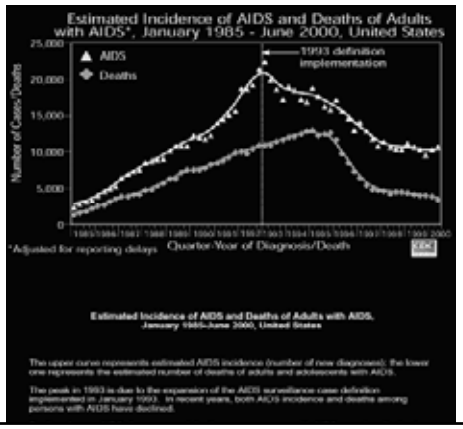



**Table 28. Estimated number of persons living with AIDS, by region of residence and year, 1993 through 2001, United States[1]**

| Region of residence[2] | Year | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
| Northeast | 51,559 | 59,225 | 65,382 | 72,142 | 79,904 | 86,008 | 92,054 | 99,450 | 106,601 |
| Midwest | 18,498 | 20,420 | 21,945 | 23,921 | 26,460 | 28,544 | 30,835 | 33,249 | 35,726 |
| South | 58,660 | 67,765 | 75,126 | 85,260 | 97,072 | 108,184 | 118,431 | 128,310 | 140,006 |
| West | 39,440 | 42,830 | 45,614 | 49,246 | 54,085 | 58,326 | 62,218 | 66,172 | 70,052 |
| U.S. dependencies, possessions, and associated nations | 5,615 | 6,212 | 6,644 | 7,166 | 7,943 | 8,646 | 9,266 | 9,836 | 10,443 |
| Total[3] | 173,772 | 196,452 | 214,711 | 237,735 | 265,464 | 289,709 | 312,804 | 337,017 | 362,827 |

[1]These numbers do not represent the actual number of persons living with AIDS. Rather, these numbers are point estimates of the number of persons living with AIDS derived by subtracting the estimated cumulative number of deaths in persons with AIDS from the estimated cumulative number of persons with AIDS diagnosed. Estimated AIDS incidence and estimated deaths are adjusted for reporting delays, but not for incomplete reporting.
[2]The year 2001 is the most recent year for which reliable estimates are available. See Technical Notes.
[3]See Technical Notes for a list of states or U.S. dependencies, possessions, and associated nations which make up each region of residence.
[3]Because column totals were calculated independently of the values for the subpopulations, the values in each column may not sum to the column total.



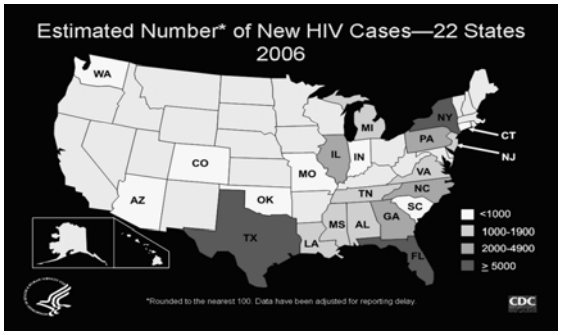
**Table 4. AIDS cases by age group, exposure category, and race/ethnicity, reported through December 1989, United States**

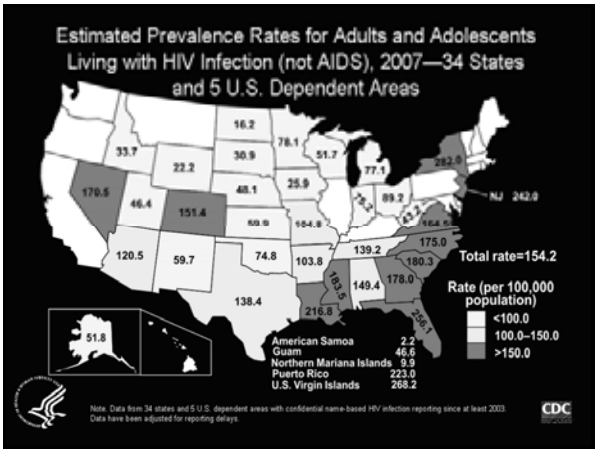
| Adult/adolescent exposure category | White, not Hispanic No. (%) | Black, not Hispanic No. (%) | Hispanic No. (%) | Asian/Pacific Islander No. (%) | American Indian/ Alaskan Native No. (%) | Total[a] No. (%) |
|---|---|---|---|---|---|---|
| Male homosexual/bisexual contact | 50,447 ( 77) | 11,501 ( 37) | 7,386 ( 42) | 533 ( 74) | 79 ( 52) | 70,093 ( 61) |
| Intravenous (IV) drug use (female and heterosexual male) | 4,909 ( 7) | 12,085 ( 39) | 7,099 ( 40) | 28 ( 4) | 26 ( 17) | 24,212 ( 21) |
| Male homosexual/bisexual contact and IV drug use | 4,794 ( 7) | 2,118 ( 7) | 1,162 ( 7) | 12 ( 2) | 21 ( 14) | 8,117 ( 7) |
| Hemophilia/coagulation disorder | 886 ( 1) | 71 ( 0) | 80 ( 0) | 15 ( 2) | 6 ( 4) | 1,062 ( 1) |
| Heterosexual contact: | 1,135 ( 2) | 3,503 ( 11) | 943 ( 5) | 27 ( 4) | 9 ( 6) | 5,630 ( 5) |
| *Sex with IV drug user* | *634* | *1,454* | *782* | *11* | *4* | *2,871* |
| *Sex with bisexual male* | *183* | *117* | *46* | *5* | *1* | *353* |
| *Sex with person with hemophilia* | *47* | *3* | *1* | *1* | – | *52* |
| *Born in Pattern-II[b] country* | *3* | *1,611* | *9* | *4* | – | *1,632* |
| *Sex with person born in Pattern-II country* | *24* | *56* | *2* | – | – | *82* |
| *Sex with transfusion recipient with HIV infection* | *61* | *10* | *8* | *1* | – | *81* |
| *Sex with HIV-infected person, risk not specified* | *183* | *252* | *115* | *5* | *4* | *559* |
| Receipt of blood transfusion, blood components, or tissue[a] | 2,050 ( 3) | 449 ( 1) | 266 ( 1) | 56 ( 8) | 3 ( 2) | 2,830 ( 2) |
| Other/undetermined[a] | 1,424 ( 2) | 1,471 ( 5) | 857 ( 5) | 45 ( 6) | 9 ( 6) | 3,842 ( 3) |
| Adult/adolescent subtotal | 65,645(100) | 31,198 (100) | 17,793(100) | 716(100) | 153(100) | 115,786(100) |

## Epidemiology

- **Geographic distribution**
- **Race/ethnicity**
- **Transmission exposure**
- **Gender**

## In 2006 : An Estimated 56,300 New Infections



## Epidemiology

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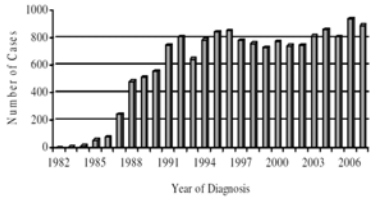
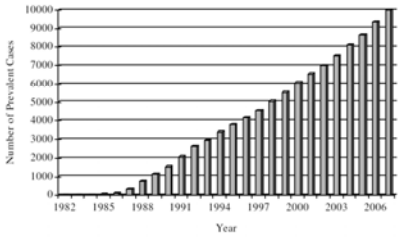
## HIV/AIDS Cases by Year of Diagnosis, Alabama 1982-2007




ADPH HIV/AIDS 2007
https://adph.org/aids

## Alabama Prevalent HIV/AIDS cases as of December 31, 2007

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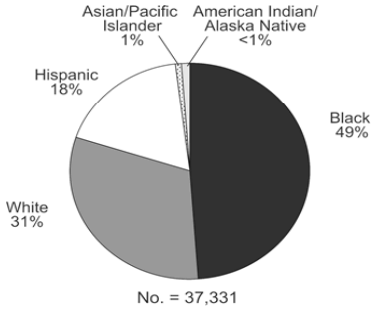
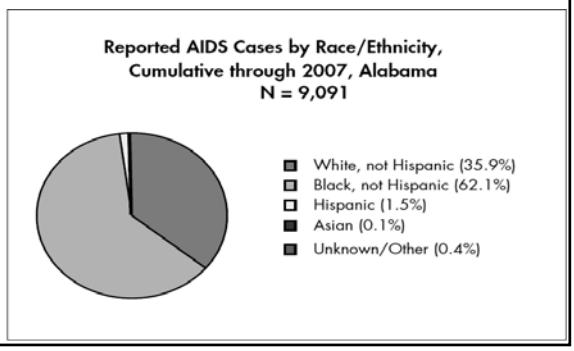
## People Living with HIV/AIDS Nationally - 2007

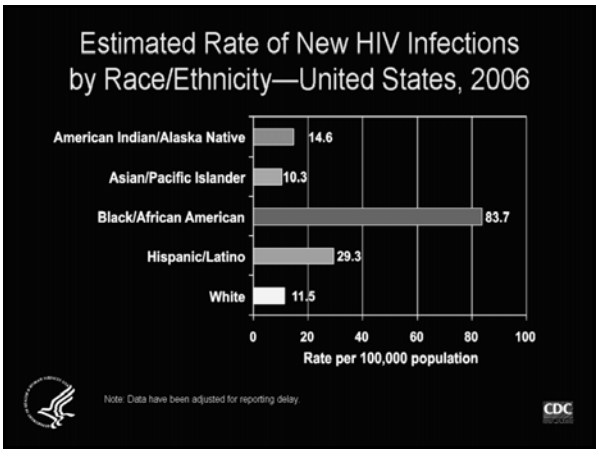


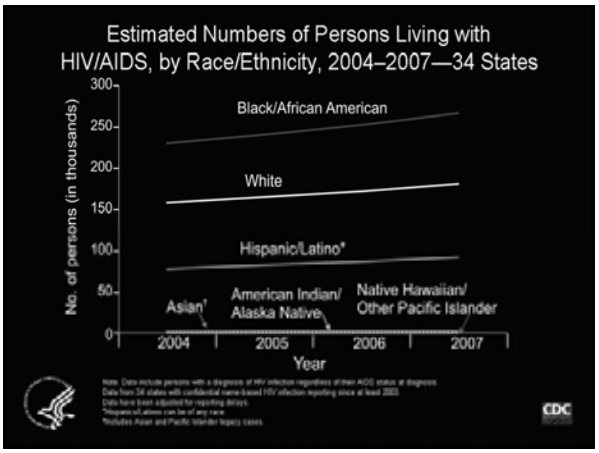

## People Living with HIV/AIDS Nationally - 2007

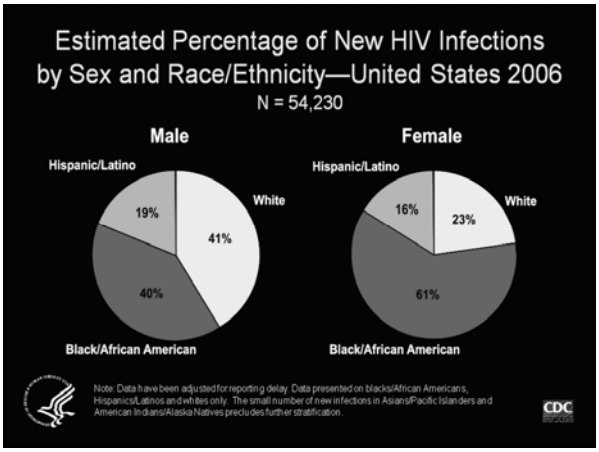
- **African Americans account for 13% and Hispanics comprise 15% of the U.S. population**

## People Living with AIDS Locally - 2007






## Epidemiology

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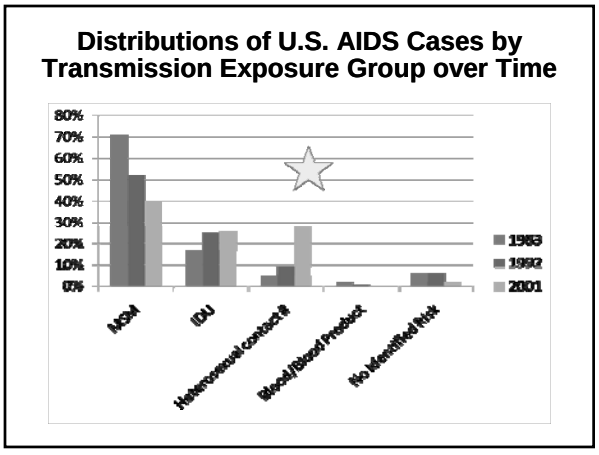
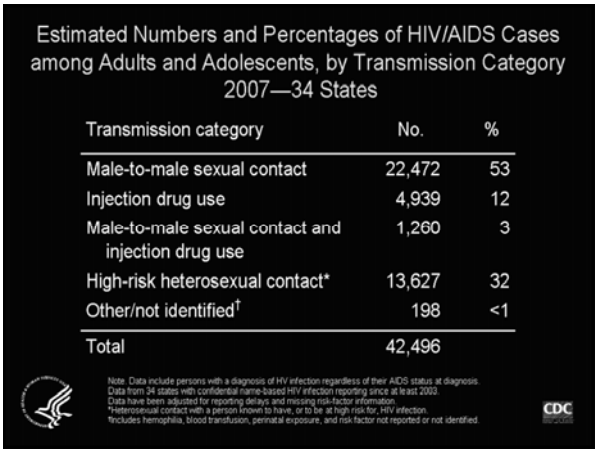
- **Race/ethnicity**
- **Transmission exposure**
- **Gender**



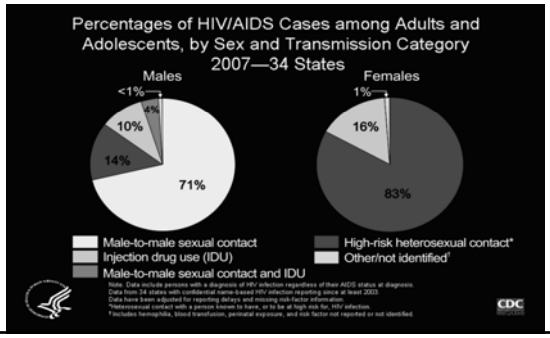
Estimated Percentage of New HIV Infections by Race/Ethnicity, Sex, and Transmission Category—United States, 2006
N = 54,230

| HIV Transmission Category | Black/African American | | Hispanic/ Latino | | White | |
|---|---|---|---|---|---|---|
| Male | No. | % | No. | % | No. | % |
| Male-to-male sexual contact | 10,130 | 63 | 5,360 | 72 | 13,230 | 81 |
| Injection drug use | 2,010 | 12 | 730 | 10 | 1,010 | 6 |
| Male-to-male sexual contact and injection drug use | 690 | 4 | 360 | 5 | 1,050 | 6 |
| Heterosexual contact* | 3,290 | 20 | 970 | 13 | 990 | 6 |
| Female | | | | | | |
| Injection drug use | 1,470 | 17 | 400 | 17 | 990 | 30 |
| Heterosexual contact* | 7,340 | 83 | 1,910 | 83 | 2,310 | 70 |

*Heterosexual contact with a person known to have, or to be at risk for, HIV infection. Note: Data have been adjusted for reporting delay and cases without risk factor information were proportionately re-distributed. Data presented on blacks/African Americans, Hispanics/Latinos and whites only. The small number of new infections in Asians/Pacific Islanders and American Indians/Alaska Natives precludes further stratification.

CDC

## Discordance in Transmission Category by Gender

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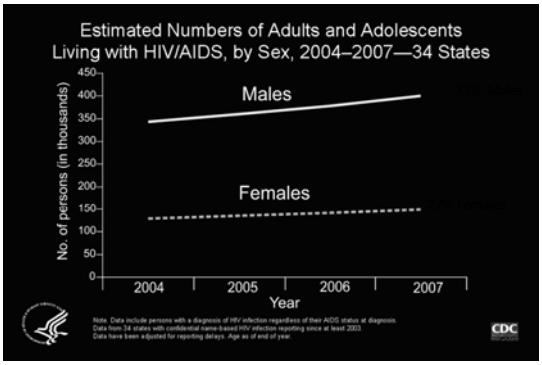
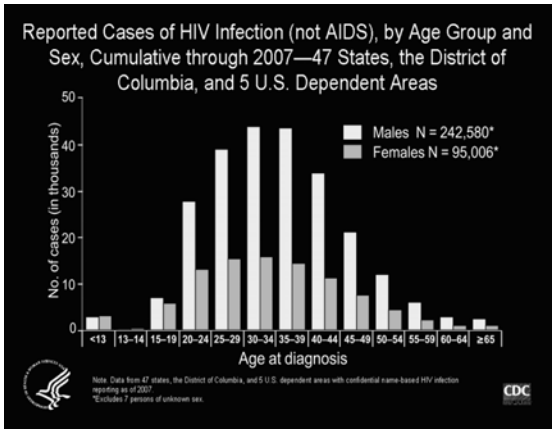
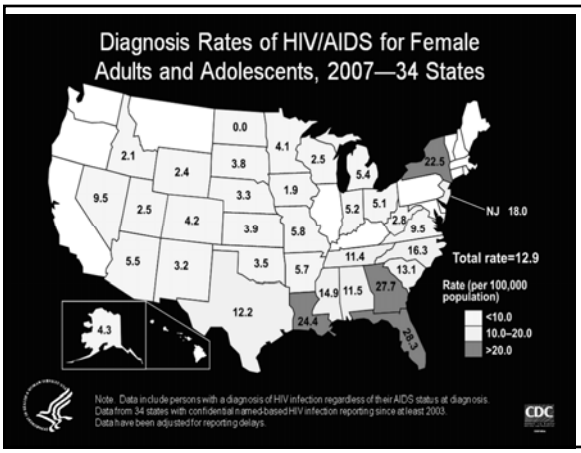
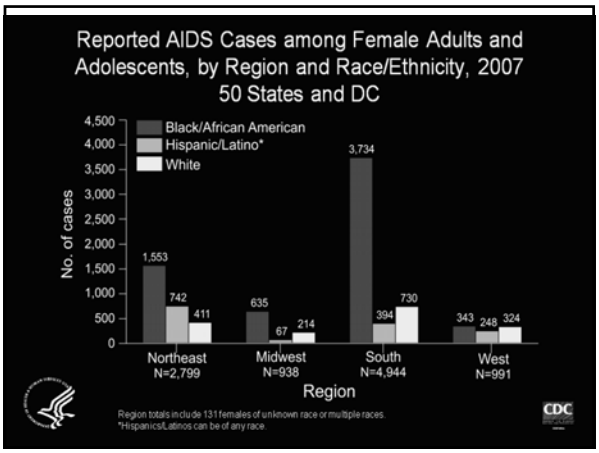
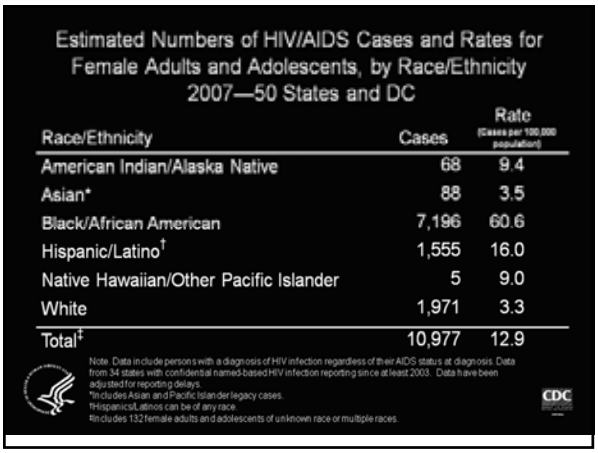


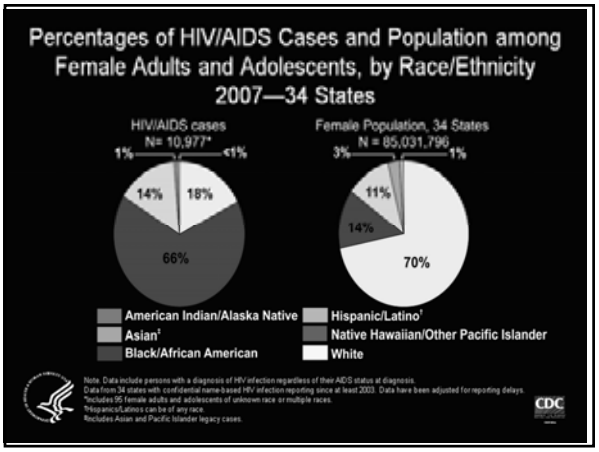

**At the end of 2007, an estimated 550,000 adults/adolescents were HIV positive**

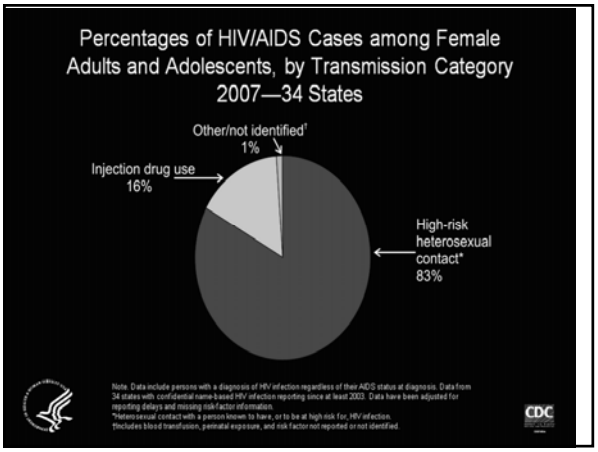


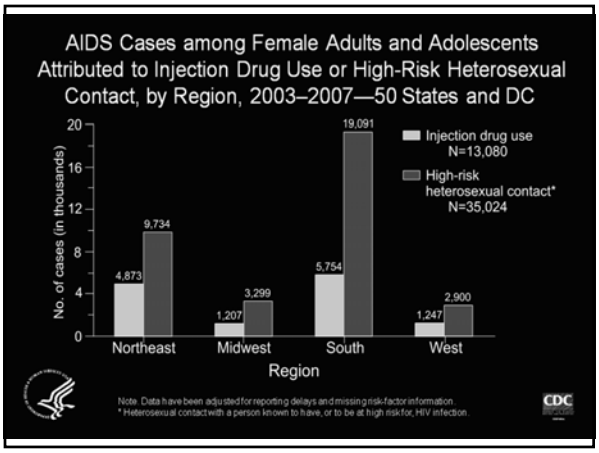



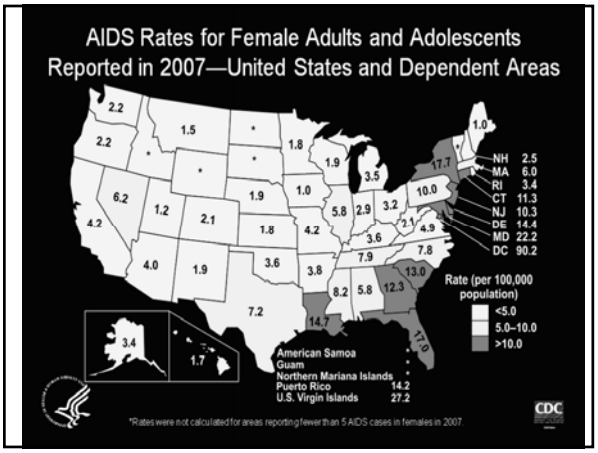

Reported AIDS Cases among Female Adults and Adolescents, by Region and Race/Ethnicity, 2007
50 States and DC
Black/African American
Hispanic/Latino*
White
No. of cases
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
1,553
742
411
635
67
214
3,734
394
730
343
248
324
Northeast N=2,799
Midwest N=938
South N=4,944
West N=991
Region
Region totals include 131 females of unknown race or multiple races.
*Hispanics/Latinos can be of any race.
CDC


Estimated Numbers of HIV/AIDS Cases and Rates for Female Adults and Adolescents, by Race/Ethnicity
2007—50 States and DC
Race/Ethnicity | Cases | Rate (Cases per 100,000 population)
American Indian/Alaska Native | 68 | 9.4
Asian* | 88 | 3.5
Black/African American | 7,196 | 60.6
Hispanic/Latino† | 1,555 | 16.0
Native Hawaiian/Other Pacific Islander | 5 | 9.0
White | 1,971 | 3.3
Total‡ | 10,977 | 12.9
Note. Data include persons with a diagnosis of HIV infection regardless of their AIDS status at diagnosis. Data from 34 states with confidential named-based HIV infection reporting since at least 2003. Data have been adjusted for reporting delays.
*Includes Asian and Pacific Islander legacy cases.
†Hispanics/Latinos can be of any race.
‡Includes 132 female adults and adolescents of unknown race or multiple races.
CDC


Percentages of HIV/AIDS Cases and Population among Female Adults and Adolescents, by Race/Ethnicity
2007—34 States
HIV/AIDS cases N= 10,977*
Female Population, 34 States N = 85,031,796
1%
<1%
14%
18%
66%
3%
1%
11%
14%
70%
American Indian/Alaska Native
Asian†
Black/African American
Hispanic/Latino†
Native Hawaiian/Other Pacific Islander
White
Note. Data include persons with a diagnosis of HIV infection regardless of their AIDS status at diagnosis.
Data from 34 states with confidential name-based HIV infection reporting since at least 2003. Data have been adjusted for reporting delays.
*Includes 95 female adults and adolescents of unknown race or multiple races.
†Hispanics/Latinos can be of any race.
‡Includes Asian and Pacific Islander legacy cases.
CDC


Percentages of HIV/AIDS Cases among Female Adults and Adolescents, by Transmission Category
2007—34 States
Other/not identified†
1%
Injection drug use
16%
High-risk heterosexual contact*
83%
Note. Data include persons with a diagnosis of HIV infection regardless of their AIDS status at diagnosis. Data from 34 states with confidential name-based HIV infection reporting since at least 2003. Data have been adjusted for reporting delays and missing risk-factor information.
*Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.
†Includes blood transfusion, perinatal exposure, and risk factor not reported or not identified.
CDC


AIDS Cases among Female Adults and Adolescents Attributed to Injection Drug Use or High-Risk Heterosexual Contact, by Region, 2003–2007—50 States and DC
No. of cases (in thousands)
20
16
12
8
4
0
4,873
9,734
1,207
3,299
5,754
19,091
1,247
2,900
Injection drug use N=13,080
High-risk heterosexual contact* N=35,024
Northeast
Midwest
South
West
Region
Note. Data have been adjusted for reporting delays and missing risk-factor information.
* Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.
CDC


AIDS Rates for Female Adults and Adolescents Reported in 2007—United States and Dependent Areas
NH 2.5
MA 6.0
RI 3.4
CT 11.3
NJ 10.3
DE 14.4
MD 22.2
DC 90.2
Rate (per 100,000 population)
<5.0
5.0–10.0
>10.0
American Samoa *
Guam *
Northern Mariana Islands *
Puerto Rico 14.2
U.S. Virgin Islands 27.2
*Rates were not calculated for areas reporting fewer than 5 AIDS cases in females in 2007.
CDC

## HIV/AIDS Cases by Race/Ethnicity & Gender, Alabama

**January 1, 2007 – December 31, 2007**

| | Female | | Male | | Total | |
|---|---|---|---|---|---|---|
| Race/Ethnicity | No. | %a | No. | %a | No. | %a |
| White | 52 | 19 | 173 | 28 | 225 | 25 |
| Black | 202 | 74 | 413 | 67 | 615 | 69 |
| Hispanic | 12 | 4 | 18 | 3 | 30 | 3 |
| Other/Unknown | 8 | 3 | 12 | 2 | 20 | 2 |
| Totalb | 274 | | 616 | | 890 | |

Note. aCalculated as the percentage of all cases during this period. Percentages do not add up to 100 due to rounding. b Totals include all cases during this period.

## Objectives

- **Identify the magnitude of HIV infection by age, gender and geographic distribution**
- **Understand the utility of opt-out HIV testing for HIV screening practice**
- **Increase knowledge of challenges in preventing maternal to child transmission of HIV in the US (MTCT)**
- **Increase knowledge of effective contraceptive options for women with HIV**

## Opt-Out Testing: Rationale

- **CDC HIV testing recommendations**
- **Prior to 2006**
  - **RISK BASED OPT-IN HIV testing for the diagnosis of HIV infection**
  - **As of 2003, an estimated 25% of HIV infections were UNDIAGNOSED**

## Opt-Out Testing: Rationale

- **Approximately 232,700 HIV infected individuals UNAWARE of their HIV status**
- **Estimated 56,000 new HIV infections per year**

## Opt-Out Testing: Rationale

- **Develop AIDS within 1 year of their HIV Diagnosis**
  - **39% of NEWLY DIAGNOSED HIV INFECTED PERSONS**
- **Enter medical care with Initial CD4 Counts ≤ 200 cells/mm$^3$**
  - **50% of NEWLY DIAGNOSED PERSONS**

## New CDC HIV Opt-Out Testing Recommendations

- **As of September 2006**
  - **OPT-OUT HIV testing for the diagnosis of HIV infection**
  - **Not risk based**
  - **All patients 13-64 years of age**
    - **After informing the patients that HIV testing will be done unless refused by the patient (opt-out testing)**

## 2006 Opt-Out Testing Recommendations

- Goal
  - Improved access to HIV
    - Prevention
    - Treatment services
  - Decrease HIV transmission

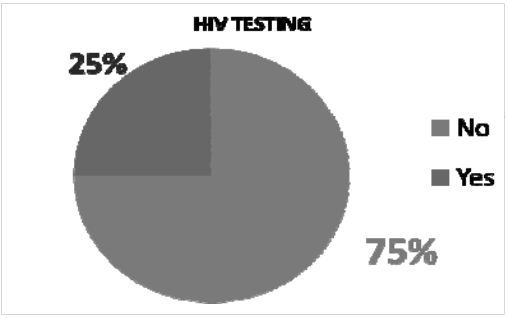
## 2006 Opt-Out Testing Recommendations

- Improved outcomes
  - Individual
  - Public Health
- Wide implementation
- Earlier diagnosis of HIV

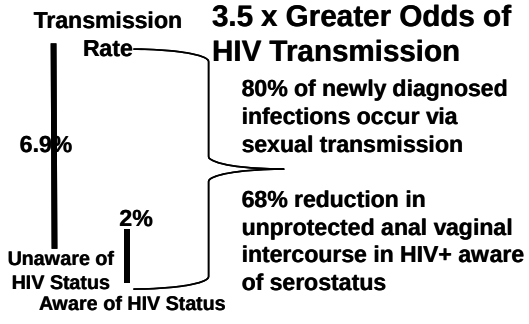
## Public Health Benefit of Opt-Out Testing

- 2001-2005 South Carolina Public Health System
  - Newly diagnosed cases
  - Median of 4 prior encounters with the health care system
- HIV testing was not performed

## Public Health Benefit of Opt-Out Testing




## Opt-Out Testing: Secondary HIV Prevention



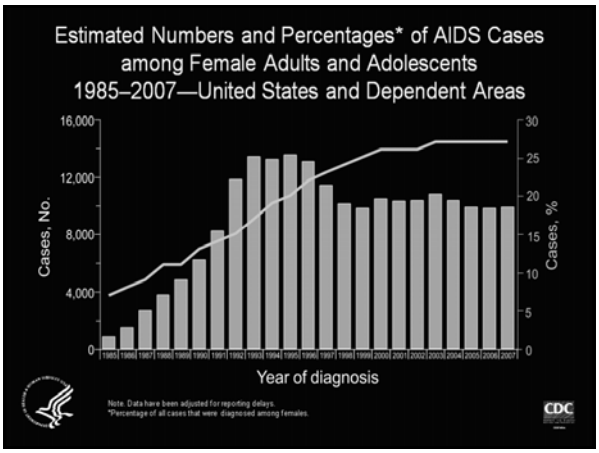

**3.5 x Greater Odds of HIV Transmission**

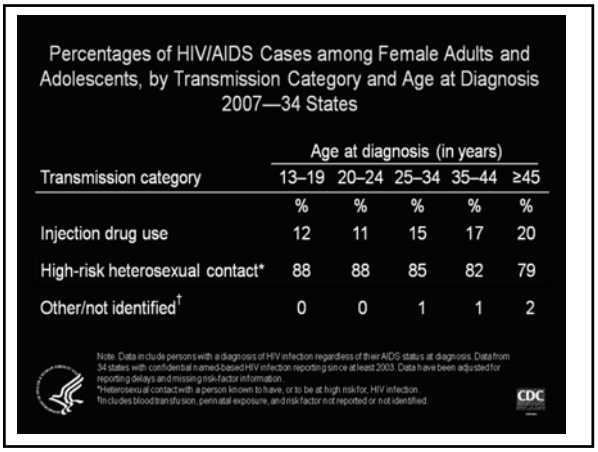
80% of newly diagnosed infections occur via sexual transmission

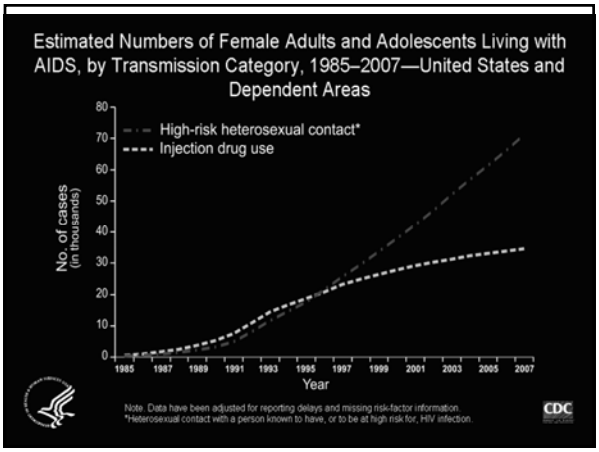
68% reduction in unprotected anal vaginal intercourse in HIV+ aware of serostatus

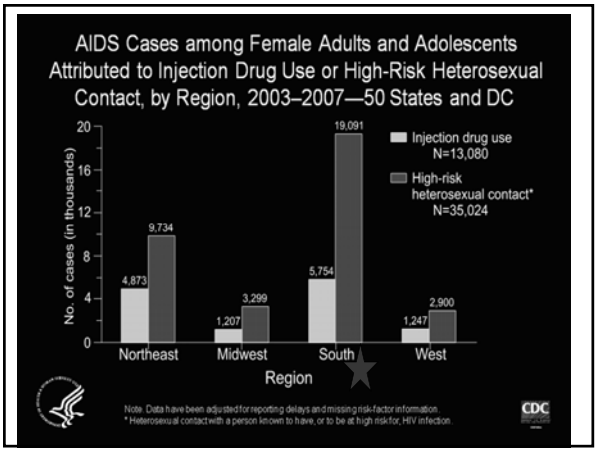
## Objectives

- Identify the magnitude of HIV infection by age, gender and geographic distribution
- Understand the utility of opt-out HIV testing for HIV screening practice
- Increase knowledge of challenges in preventing maternal to child transmission of HIV in the US (MTCT)
- Increase knowledge of effective contraceptive options for women with HIV


Estimated Numbers and Percentages* of AIDS Cases among Female Adults and Adolescents 1985–2007—United States and Dependent Areas
Cases, No.
Cases, %
Year of diagnosis
Note. Data have been adjusted for reporting delays.
*Percentage of all cases that were diagnosed among females.
CDC


Percentages of HIV/AIDS Cases among Female Adults and Adolescents, by Transmission Category and Age at Diagnosis 2007—34 States
Age at diagnosis (in years)
Transmission category 13–19 20–24 25–34 35–44 ≥45
% % % % %
Injection drug use 12 11 15 17 20
High-risk heterosexual contact* 88 88 85 82 79
Other/not identified† 0 0 1 1 2
Note. Data include persons with a diagnosis of HIV infection regardless of their AIDS status at diagnosis. Data from 34 states with confidential named-based HIV infection reporting since at least 2003. Data have been adjusted for reporting delays and missing risk-factor information.
*Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.
†Includes blood transfusion, perinatal exposure, and risk factor not reported or not identified.
CDC


Estimated Numbers of Female Adults and Adolescents Living with AIDS, by Transmission Category, 1985–2007—United States and Dependent Areas
High-risk heterosexual contact*
Injection drug use
No. of cases (in thousands)
Year
Note. Data have been adjusted for reporting delays and missing risk-factor information.
*Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.
CDC


AIDS Cases among Female Adults and Adolescents Attributed to Injection Drug Use or High-Risk Heterosexual Contact, by Region, 2003–2007—50 States and DC
Injection drug use N=13,080
High-risk heterosexual contact* N=35,024
No. of cases (in thousands)
4,873
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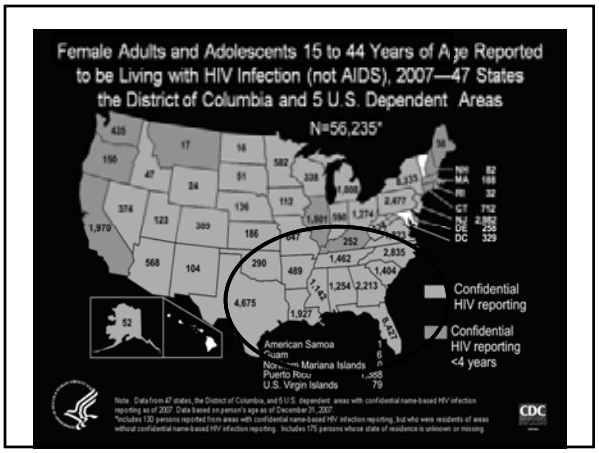
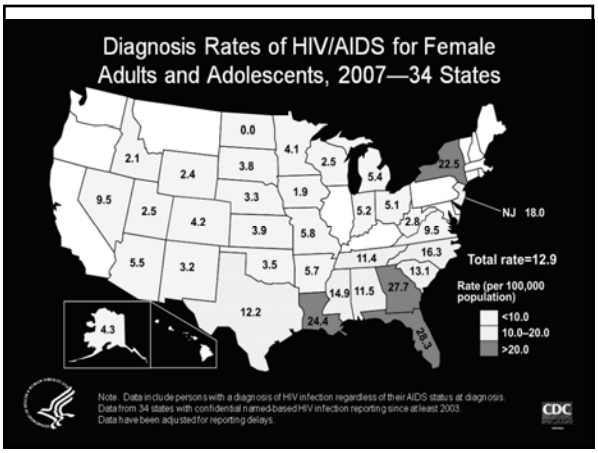
Northeast
Midwest
South
West
Region
Note. Data have been adjusted for reporting delays and missing risk-factor information.
* Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.
CDC


Female Adults and Adolescents 15 to 44 Years of Age Reported to be Living with HIV Infection (not AIDS), 2007—47 States the District of Columbia and 5 U.S. Dependent Areas
N=56,235*
Confidential HIV reporting
Confidential HIV reporting <4 years
American Samoa 1
Guam 6
Northern Mariana Islands 0
Puerto Rico 1,368
U.S. Virgin Islands 79
Note. Data from 47 states, the District of Columbia, and 5 U.S. dependent areas with confidential name-based HIV infection reporting as of 2007. Data based on person's age as of December 31, 2007.
*Includes 130 persons reported from areas with confidential name-based HIV infection reporting, but who were residents of areas without confidential name-based HIV infection reporting. Includes 175 persons whose state of residence is unknown or missing.
CDC

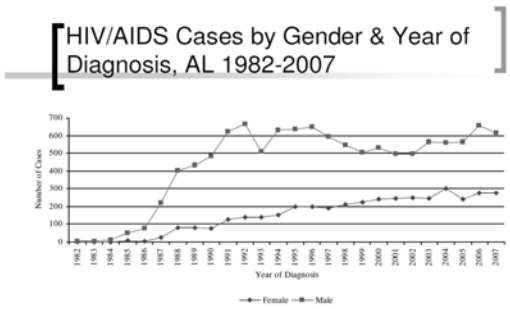

Diagnosis Rates of HIV/AIDS for Female Adults and Adolescents, 2007—34 States
NJ 18.0
Total rate=12.9
Rate (per 100,000 population)
<10.0
10.0–20.0
>20.0
Note. Data include persons with a diagnosis of HIV infection regardless of their AIDS status at diagnosis. Data from 34 states with confidential named-based HIV infection reporting since at least 2003. Data have been adjusted for reporting delays.
CDC

## 2006 Age at HIV Infection

- In 2006
  - 56,300 new HIV Infections
- Overall rate of new HIV infections
  - 22.8 per 100,000
- Persons aged 13-29 accounted for the largest number of new HIV infections (19,200 [34%])

## 2006 Age at HIV Infection

- Persons aged 30-39 accounted for estimated 17,400 (31%) new HIV infections
  - Highest rate of new infections for persons aged 30-39 years (42.6 per 100,000)

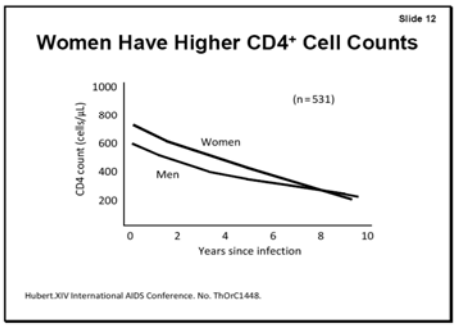



ADPH HIV/AIDS 2007
https://adph.org/aids

## HIV Infection in Women: Natural History

- Women have higher CD4 counts during early infection
  - However, after approximately 6-8 years of infection, the difference in between genders CD4 counts diminishes

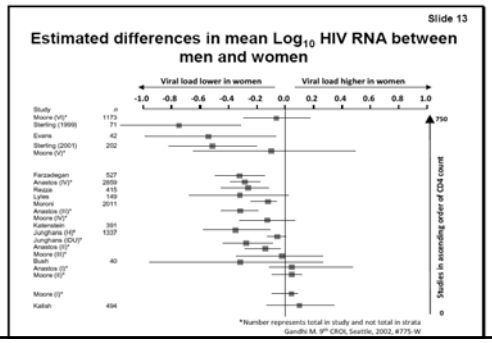
## HIV Infection in Women: Natural History



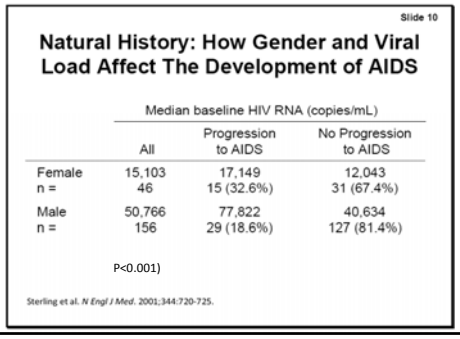

## HIV Infection in Women: Natural History

- At higher CD4 counts women have lower viral loads then their male counterparts
- When their CD4 count reaches 200 cells/mm$^3$, the difference according to gender diminishes

## HIV Infection in Women: Natural History




## HIV Infection in Women: Natural History



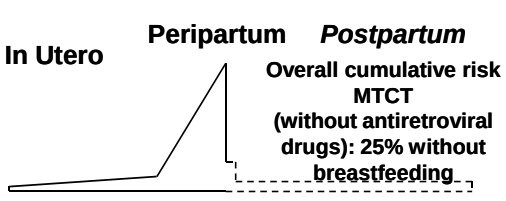

## HIV Infection in Women: Natural History

- **Women start off with a higher CD4 CT and lower corresponding viral load**
- **Women and men have similar rates of progression to AIDS**

## HIV Infection in Women: Natural History

- **Once on ARVs, women are more likely to experience complications**
  - **Pancreatitis, lactic acidosis, rash, fat accumulation, bone mineral density changes (?)**

## Timing of Mother to Child HIV Transmission: No Breastfeeding




**25-35% in utero (majority late)**

**65-75% peripartum**

## Risks of MTCT

- **Maternal factors**
  - **Higher maternal viral load**
  - **Lower CD4 count**
  - **Smoking**
  - **Other infections**
    - **Active HSV, Genital Ulcer Disease, BV, Hepatitis C**

## Risks of MTCT

- Obstetric factors
  - Invasive procedures/vaginal delivery
  - Chorioamnionitis
- Infant factors
  - Severe prematurity
    - <33 weeks
  - Multiple gestation

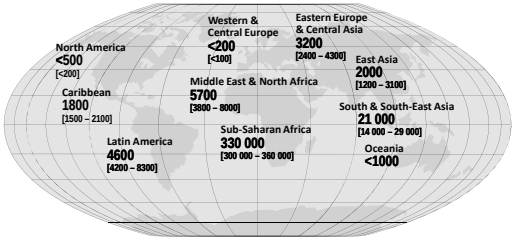
## Risks of MTCT

- Lower maternal viral load
- Effective ART
- Cesarean section delivery
- Intrapartum ART
- Formula feeding

## "Uncontrolled" HIV

- Decrease fertility by 30%
  - Viral load
- Increases still birth, low birth weight, intrauterine growth retardation, chorioamnionitis
- Increases maternal mortality

## Estimated Number of Children (<15 years) Newly Infected with HIV - 2007




- Total: 370,000 (330,000 – 410,000)
- MTCT reduced to <2% in countries which bear <1% of global pediatric HIV burden

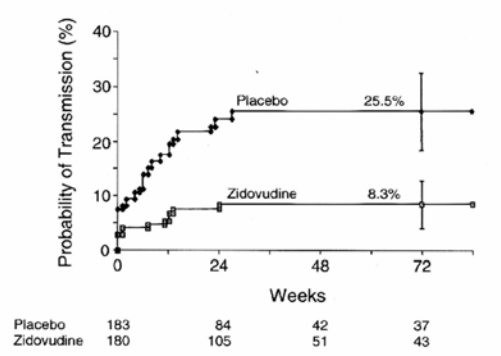
## PACTG 076

- Efficacy and safety of Zidovudine in reducing the risk of maternal to infant transmission of HIV
  - Study design: early '90's
    - Randomized, double-blind, placebo-controlled trial

## PACTG 076

- Participants: HIV-infected pregnant women with CD4+ ct > 200
- ZDV regimen
  - Antepartum ZDV (100 mg orally 5 times daily)
  - Intrapartum ZDV
  - Post exposure prophylaxis ZDV for the newborn (for 6 weeks)

## PACTG 076




## PACTG 076

- 67% relative reduction in risk of HIV transmission
- Results
  - Enrolled 477 pregnant women
  - 415 live-born infants
    - ZDV Group: 13/180 infants HIV +

## PACTG 076

- Placebo Group 40/182 infants were HIV +
- 67.5 % relative reduction in the risk of HIV transmission ($P < 0.05$)

## Combination Antiretroviral Strategies

- For the treatment of pregnant HIV-1 infected women and prevention of perinatal HIV-1 transmission
- Prospective Cohort Study, HIV RNA levels from 1542 HIV infected women with live births from 1990-2000

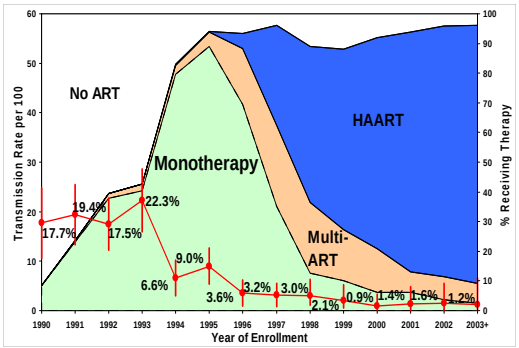
## Combination Antiretroviral Strategies

- Evaluate impact of different ARV regimens on perinatal HIV transmission at population level
- Risk of perinatal transmission of HIV-1 among (1146) women on ART during pregnancy

## Combination Antiretroviral Strategies

- Being on ART was protective
- Planned C Section was protective
- Maternal plasma HIV-1 RNA levels at delivery
- Rates of transmission with VL<400= 1.1%

**Trends in Perinatal HIV Transmission and Maternal Antiretroviral Therapy, Women and Infants Transmission Study: 1990-2004**




**Perinatal Transmission of Human Immunodeficiency Virus Type 1 by Pregnant Women with RNA Virus Loads <1000 Copies/mL**

John P. A. Ioannidis,[1,2] Elaine J. Abrams,[3,4] Arthur Ammann,[5] Marc Bulterys,[5] James J. Goedert,[6] Linsay Gray,[10] Berne T. Korber,[9,10] Marie Jeanne Mayaux,[11] Lynne M. Mofenson,[12] Marie-Louise Newell,[13] David E. Shapiro,[3] Jean Paul Teglas,[11] and Catherine M. Wilfert[14]

[1]Department of Hygiene and Epidemiology, University of Ioannina School of Medicine, Ioannina, Greece [2]Department of Medicine, Tufts-University School of Medicine, and [3]Center for Biostatistics in AIDS Research, Harvard School of Public Health, Boston, Massachusetts; [4]Department of Pediatrics, Mailman Hospital Center, and [5]College of Physicians and Surgeons, Columbia University, New York, New York; [6]Global Strategies for HIV Prevention, San Rafael, California; [7]Mother-Child Transmission and Pediatric and Adolescent Studies Section, Epidemiology Branch, Division of HIV/AIDS Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia; [8]Viral Epidemiology Branch, Division of Cancer Epidemiology and Genetics, National Cancer Institute, and [9]Pediatric, Adolescent and Maternal AIDS Branch, National Institute of Child Health and Human Development, National Institutes of Health, Rockville, Maryland; [10]European Collaborative Study Coordinating Centre, Department of Paediatric Epidemiology and Biostatistics, Institute of Child Health, London, United Kingdom; [11]Santa Fe Institute, Santa Fe, and [12]Los Alamos National Laboratory, Los Alamos, New Mexico; [13]Hôpital Kremlin-Bicêtre, INSERM Unit 292, Le Kremlin-Bicêtre, France; [14]Department of Pediatrics, Duke University Medical Center, Durham, North Carolina

**Multivariate analysis:**

**Lower Transmission with ARV, C-Section, Greater Birth Weight, or Higher CD4 Ct**

The Journal of Infectious Diseases 2001; 183:539–45

## Perinatal Transmission

- 44/1202 cases of vertical transmission VL<1000
  - Mothers + ARV
    - Transmission rate 1%
  - Mothers with ARV
    - Transmission rate 9.8%

## Mechanism of Action of ARV PPX

- Decrease maternal VL in blood & genital secretions
  - Decreased transmission with VL<1000 copies/ml
- Infant pre-exposure prophylaxis
  - Transplacental transport of the drug
- Active ARV in infant circulation at the time of labor and delivery

## Clinical Recommendations for HIV+ Women and Pregnancy

- Preconception counseling
  - Reproductive plan
  - Seek pregnancy
    - Address breast feeding risks, minimizing risk to partner and vertical transmission

## Clinical Recommendations for HIV+ Women and Pregnancy

  - Role pregnancy on HIV disease
- General screening during pregnancy
  - Opt-Out Testing, and during labor (if no prior test) repeat in 3rd trimester if high risk

## Clinical Recommendations for HIV+ Women and Pregnancy

- ART
  - HAART is recommended for all pregnant women
    - May delay initiation until 10-12 weeks of gestation
- Long term follow up infants born to mothers on ART during pregnancy, regardless of infant HIV status

## Clinical Recommendations: HIV and Pregnancy

- ART is recommended in all pregnant women
  - Despite virologic, immunologic, or clinical parameters to prevent MTCT
- Childbearing potential
  - Advise against efavirenz

## Clinical Recommendations: HIV and Pregnancy

- HAART (include ZDV)
  - For HIV Treatment and PMTCT
    - IV ZDV during labor + infant oral therapy x 6 weeks
- Stable maximally suppressed VL prior to conception

## Clinical Recommendations: HIV and Pregnancy

- HIV screening as prenatal panel, repeat HIV test in 3rd trimester (high risk)
- Check viral load if acute seroconversion is a consideration, confirm and repeat at 4-6 weeks
- Advise against breastfeeding

## Clinical Recommendations: HIV and Pregnancy

- Advise against SD NVP to ART regimen
- Genotypic resistance is recommended prior to initiation of ART

## Recommended Antiretroviral Therapy for Pregnancy

- HAART during pregnancy
- Intrapartum intravenous AZT + (additional antiretrovirals)
- Postnatal AZT therapy for infant x 6 weeks

## Safety of ARV Drugs in Pregnant Women

- Pharmacokinetics
  - Affect in absorption, distribution, metabolism and elimination of drugs
  - Current pharmacokinetic studies

    NO dosing changes for
    - ZDV, 3TC, DDI, D4T or NVP

## Safety of ARV Drugs in Pregnant Women

- 4 Protease Inhibitors not require dosing adjustments
  - SQV, RTV, Indinavir, Nelfinavir

## ARV in Pregnancy: NRTIs

- Pros
  - ZDV/3TC
    - Well studied
  - Documented efficacy
    - Decrease genital shedding, decrease in risk vertical transmission

## ARV in Pregnancy: NRTIs

- Not a tetratogen
- No dosing changes
- Backbone of choice if concurrent Hepatitis B
- No effect on bone demineralization

## ARV in Pregnancy: NRTIs

- Cons
  - ZDV/3TC: nausea,headache, myalgias, insomnia
  - Contraindicated
    - Liver/kidney dysfxn or blood dyscrasias
  - Combination therapy
    - Toxic side effects
      - Avoid ddI and d4T

## ART in Pregnancy: NNRTI's

- PROs
  - NVP: Documented benefit of SD NVP decrease vertical transmission
    - Not a tetratogen
    - No dosing changes

## ART in Pregnancy: NNRTI's

- CONs
  - NVP: hepatoxicity and rash
    - 10x risk of hepatotoxicity with CD4>250
  - EFV: Tetratogen

## ART in Pregnancy: PI's

- Pros
  - Efficacy in adults for combination therapy
  - When PI based regimen is needed in PG
    - R-SQV and NFV

## ART in Pregnancy: PI's

- Cons
  - Don't cross the placenta
  - Hyperglycemia known side effect
  - Premature delivery
  - Indinavir: indirect hyperbilirubinemia in neonate

## Opt-Out Testing: Reduce MTCT of HIV

- 2005
  - 31% of mothers of HIV+ infants had not been tested for HIV until after delivery
- "One test two lives"

## Opt-Out Testing: Reduce MTCT of HIV

- Opt-out
  - Pregnant women are told that an HIV test will be included in her regular prenatal tests
  - States all pregnant women are given the test
  - Patient has the choice to opt-out

## Opt-Out Testing: Reduce MTCT of HIV

- 1998-1999 Opt-in states
  - HIV testing rate 25%-69%
- 1998-1999 Opt-out states
  - HIV testing rate 85%

## Opt-Out in Pregnancy

- Universal Opt-out with a 2nd test in 3rd trimester of high risk women
- If no prenatal test result
  - Rapid HIV testing at L & D
  - Explore why a prior test was declined

## Opt-Out in Pregnancy

- Goal
  - Increase testing rates, increase knowledge of serostatus, increase # offered treatment
  - Decrease MTCT of HIV

## Challenges in the US in Preventing MTCT of HIV

- Increase in HIV cases in women of childbearing age
- Lack of prenatal care
  - 2001-2004, 16% of mothers with HIV+ infants lacked prenatal care
- Lack of postnatal care

## Challenges in the US in Preventing MTCT of HIV

- 2001-2004
  - 46% of MTCT cases did not get prenatal monotherapy ARV at a minimum (ZDV)
  - 41% did not receive intrapartum ARVS
  - 25% of the infants did not receive postnatal ARVs

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Recent trends in the incidence and morbidity that are associated with perinatal human immunodeficiency virus infection in the United States

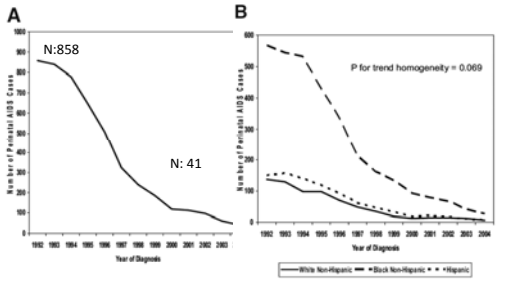
Matthew T. McKenna, MD, MPH; Xiaohong Hu, MS

TABLE 2
Number of perinatally infected infants by year of birth in the year of the report to the national database among 33 states with HIV infection report that have reported since 2001

| Year of birth | Year of report | | | | | Number of infected infants in the birth cohort | |
|---|---|---|---|---|---|---|---|
| | 2001 | 2002 | 2003 | 2004 | 2005 | n | N (95% CI)* |
| 2001 | 39 | 74 | 31 | 8 | 10 | 162 | 277 (224-346) |
| 2002 | — | 29 | 50 | 21 | 9 | 109 | 204 (161-276) |
| 2003 | — | — | 25 | 34 | 27 | 86 | 167 (127-224) |
| 2004 | — | — | — | 25 | 33 | 58 | 138 (96-186) |

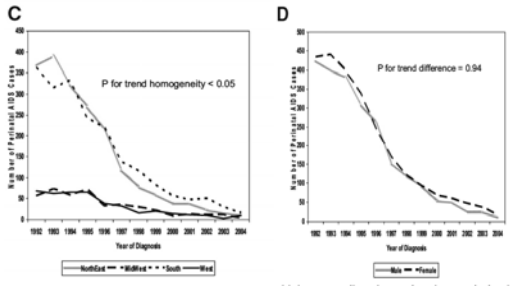
CI, confidence interval
* Total number of actual cases reported in birth cohort from 33 states (n).
† Data from 33 states with HIV infection that were reported were extrapolated to the entire United States (N). Estimates include adjustments for delays in reporting and misreporting of cases.

FIGURE
Trends in perinatal AIDS cases in the United States, 1992-2004




United States AIDS cases in children <13 years old that are attributed to perinatal transmission by **A**, year, **B**, race/ethnicity, **C**, region, and **D**, gender from 1992-2004.
McKenna. Recent trends in perinatal HIV in the United States. AJOG 2007.

FIGURE
**Trends in perinatal AIDS cases in the United States, 1992-2004**

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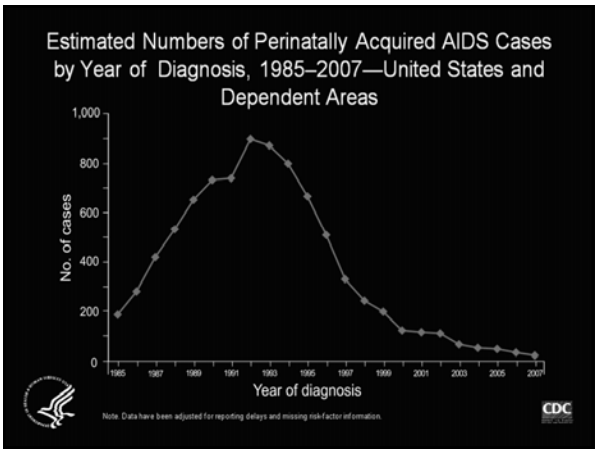


## Objectives

- **Identify the magnitude of HIV infection by age, gender and geographic distribution**
- **Understand the utility of opt-out HIV testing for HIV screening practice**
- **Increase knowledge of challenges in preventing maternal to child transmission of HIV in the US (MTCT)**
- **Increase knowledge of effective contraceptive options for women with HIV**

## Contraceptive Options for Women with HIV

- **Remember barrier method plus….**
  - **Prevent STD and HIV transmission**
- **Hormonal methods**
  - **On ART**
    - **Known drug interactions with ART and hormonal contraceptives**

## Contraceptive Options for Women with HIV

- **Protease inhibitors and NNRTIs**

- **Off of ART**
  - **All contraceptive methods are suitable**
  - **If she does NOT want to conceive**
    - **IUD, permanent sterilization**

**DHHS Guidelines for the Use of Antiretroviral Agents in HIV-1 infected Adults and Adolescents- December 1, 2009**

| Hormonal Contraceptives | | | |
|---|---|---|---|
| Hormonal contraceptives | RTV-boosted PIs | | |
| | ATV/r | ↓ ethinyl estradiol<br>↑ norgestimate | Oral contraceptive should contain at least 35mcg of ethinyl estradiol. Oral contraceptives containing progestins other than norethindrone or norgestimate have not been studied. |
| | DRV/r | ethinyl estradiol AUC ↓ 44%<br>norethindrone AUC ↓ 14% | Use alternative or additional method. |
| | FPV/r | ethinyl estradiol AUC ↓ 37%<br>norethindrone AUC ↓ 34% | Use alternative or additional method. |
| | LPV/r | ethinyl estradiol AUC↓ 42%<br>norethindrone AUC ↓ 17% | Use alternative or additional method. |
| | SQV/r | ↓ ethinyl estradiol | Use alternative or additional method. |
| | TPV/r | ethinyl estradiol AUC ↓ 48%<br>norethindrone: no significant change | Use alternative or additional method. |
| | PIs without RTV | | |
| | ATV | [illegible] | [illegible] |
| | FPV | [illegible] | Use alternative method. |
| | IDV | [illegible] | No dose adjustment |
| | NFV | [illegible] | Use alternative or additional method. |

| Hormonal Contraceptives | | | |
|---|---|---|---|
| Hormonal contraceptives | EFV | ethinyl estradiol AUC ↑ 37% | Clinical significance unknown |
| | ETR | ethinyl estradiol AUC ↑ 22%<br>norethindrone: no significant effect | No dosage adjustment necessary |
| | NVP | ethinyl estradiol AUC ↓ 26%<br>norethindrone AUC ↓ 19% | Use alternative or additional methods. |
| | | depomedroxyprogesterone acetate: no significant change | No dosage adjustment necessary |
| Hormonal Contraceptives | MVC | No significant effect on ethinyl estradiol or levonorgestrel | Safe to use in combination |

## Contraceptive Options for Women with HIV

*What can an HIV-infected woman use for birth control? Anything she wants to (almost)……*

*Interactions between HIV Medications and Oral Contraceptives*

| Antiretroviral Drug (Generic, *Trade*) | Effect of Interaction with OCs | Contraceptive Recommendation |
|---|---|---|
| Nevirapine *(Viramune)* | 19% ↓ EE* level | Use backup |
| Efavirenz *(Sustiva, Atripla)* | 37% ↑ EE level | Use lowest OC dose |
| Indinavir *(Crixivan)* | 25% ↑ EE level<br>↑ norethindrone level | Use lowest OC dose |
| Nelfinavir *(Viracept)* | 47% ↓ EE level | Use backup |
| Lopinavir/ritonavir *(Kaletra)* | 42% ↓ EE level | Use backup |
| Fosamprenavir *(Lexiva)* | ↑ EE level, ↑norethindrone level<br>↓ amprenavir level | Do not combine |
| Atazanavir *(Reyataz)* | ↑ EE level<br>↑ norethindrone level > 100% | Use lowest OC dose |
| Ritonavir *(Norvir)* and "boosted" protease inhibitors | 40% ↓ EE level | Use backup |

* EE = ethinyl estradiol

Table references: Anderson, Piccitelli

Mixed Results: ↓ or no dose change

48% AUC

Cytochrome P450: Change in concentration & potency

Southeast AIDS Training and Education Center (SEATEC) April 2009

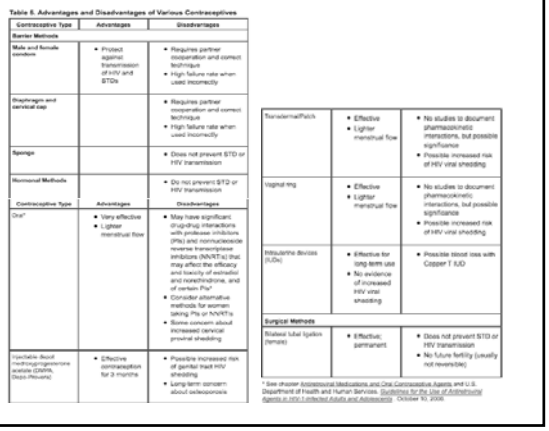

Table 5. Advantages and Disadvantages of Various Contraceptives

| Contraceptive Type | Advantages | Disadvantages |
|---|---|---|
| **Barrier Methods** | | |
| Male and female condom | • Protect against transmission of HIV and STDs | • Requires partner cooperation and correct technique<br>• High failure rate when used incorrectly |
| Diaphragm and cervical cap | | • Requires partner cooperation and correct technique<br>• High failure rate when used incorrectly |
| Sponge | | • Does not prevent STD or HIV transmission |
| **Hormonal Methods** | | • Do not prevent STD or HIV transmission |
| **Contraceptive Type** | **Advantages** | **Disadvantages** |
| Oral* | • Very effective<br>• Lighter menstrual flow | • May have significant drug-drug interactions with protease inhibitors (PIs) and nonnucleoside reverse transcriptase inhibitors (NNRTIs) that may affect the efficacy and toxicity of estradiol and norethindrone, and of certain PIs*<br>• Consider alternative methods for women taking PIs or NNRTIs<br>• Some concern about increased cervical proviral shedding |
| Injectable (depot medroxyprogesterone acetate [DMPA; Depo-Provera]) | • Effective contraception for 3 months | • Possible increased risk of genital tract HIV shedding<br>• Long-term concern about osteoporosis |
| Transdermal Patch | • Effective<br>• Lighter menstrual flow | • No studies to document pharmacokinetic interactions, but possible significance<br>• Possible increased risk of HIV viral shedding |
| Vaginal ring | • Effective<br>• Lighter menstrual flow | • No studies to document pharmacokinetic interactions, but possible significance<br>• Possible increased risk of HIV viral shedding |
| Intrauterine devices (IUDs) | • Effective for long-term use<br>• No evidence of increased HIV viral shedding | • Possible blood loss with Copper T IUD |
| **Surgical Methods** | | |
| Bilateral tubal ligation (female) | • Effective; permanent | • Does not prevent STD or HIV transmission<br>• No future fertility (usually not reversible) |

* See chapter Antiretroviral Medications and Oral Contraceptive Agents and U.S. Department of Health and Human Services. Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents. October 10, 2008.

## Other Hormonal Contraceptive Agents

- **Depo Provera (Medroxyprogesterone acetate) Injection**
  - **Bone mineral density**
  - **Calcium supplement**
  - **Not interact with Nelfinavir, Nevirapine, Efavirenz**
- **3 month efficacy**

## Other Hormonal Contraceptive Agents

- **Etonorgestrel (Implanon) Implant**
  - **Non adjustable dose**
  - **No studies to date re: ART interaction**
- **Transdermal patch (Ortho Evra) & Vaginal Ring (NuvaRing)**

## Other Hormonal Contraceptive Agents

- **Consider interactions similar to that of combined OCPS**
- **No Studies to Date re: ART interaction**
- **Levonorgestrel (Plan B) IUD**
  - **No Studies to Date: re: ART**

## Non-Hormonal Contraceptive Options

- **IUD: Intrauterine Device**
  - **HIV + and HIV – women**
  - **IUD and HIV transmission**
    - **Absence of association**
  - **Levonorgestrel IUD**
    - **Hormone levels in presence of ART not known**

## Non-Hormonal Contraceptive Options

- Copper T
- HIV + must weight risk and benefits with IRIS and AIDS

## Non-Hormonal Contraceptive Options

- Female condom
  - Usage errors with ring slippage
  - Associated failure rate of 26%
- Spermicides
  - Not recommended
    - Regardless of condoms

## Non-Hormonal Contraceptive Options

- Not protect against HIV
- Mucosal irritation and inflammation
- Change in vaginal flora

## Take Home Points

- Rates of HIV infection in women continue to rise
- Female minorities are at particular risk of HIV
- "Think HIV"
- Test and counsel for HIV regardless of perceived risk
- Consider contraceptive options in women of child bearing age