AETC AIDS Education & Training Center Program Southeast

Prevention of Perinatal HIV Transmission

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Faculty Disclosure

- My spouse and I have not had any relevant financial relationships to disclose.

Educational Need/Practice Gap

Gap = Current HIV treatment options allow for the elimination of perinatal HIV transmission in high resource settings, yet perinatal HIV transmission still occurs in the US

Need = Better awareness of the risk for HIV and engagement in care for HIV-infected women before, during, and after pregnancy

Objectives

- Upon completion of this educational activity, you will be able to:
  - Discuss the global and US burden of HIV in women of childbearing age
  - Explain the baseline risk and timing of perinatal HIV transmission
  - Outline current recommendations for pregnant women with HIV
  - Discuss current recommendations for infants perinatally exposed to HIV
  - Describe breastfeeding practices and HIV transmission

Expected Outcome

- Better understanding of perinatal HIV transmission and our current shortfalls in preventing it

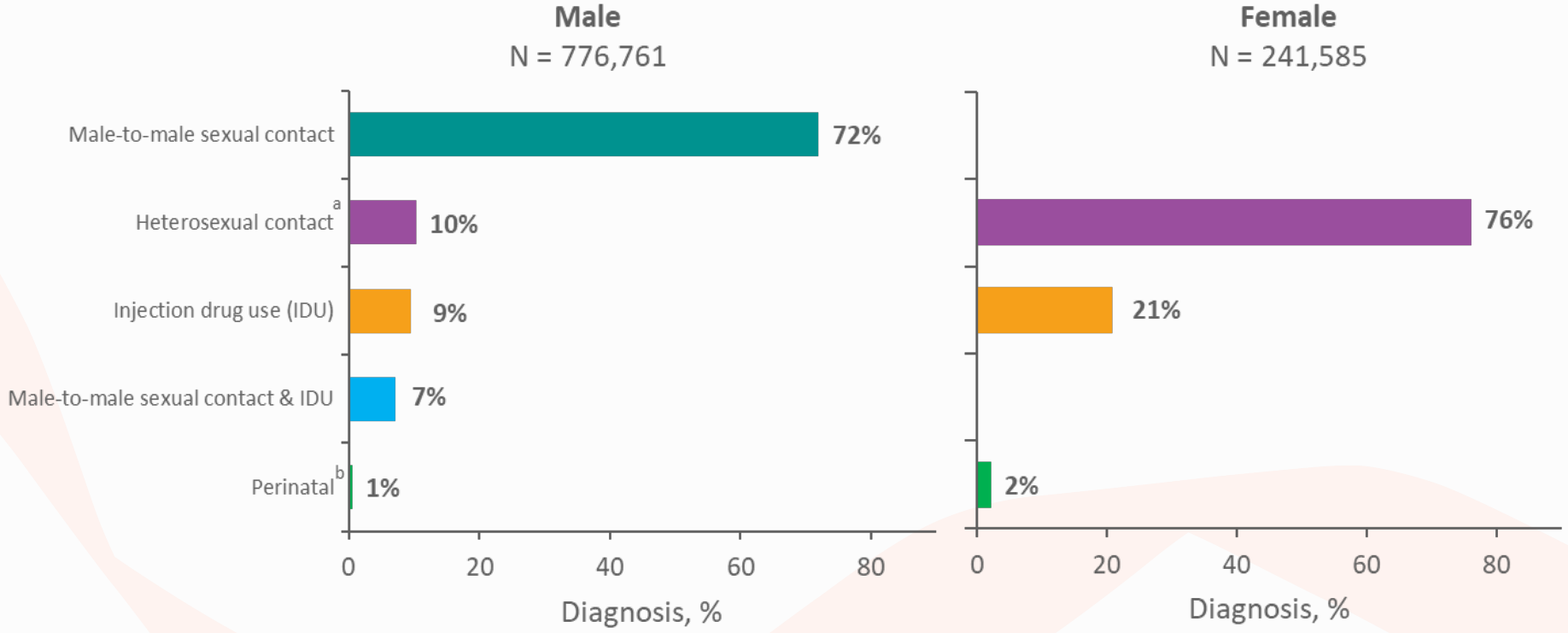
HIV in women of childbearing age

- Worldwide - 17.4 million women living with HIV in 2018
  - 51% of the global HIV burden
- 1.3 million estimated to need ART to prevent perinatal transmission
  - 1.2 million in Africa

- Around 90,700 women living with HIV in the US 13-44yo
- Around 5,000 women with HIV are estimated to give birth in the US each year
- In 2017 there were 73 children under 13yo diagnosed with perinatally-acquired HIV infection in the US

https://www.cdc.gov/hiv/group/gender/pregnantwomen/index.html
https://www.cdc.gov/hiv/pdf/library/reports/surveillance/cdc-hiv-surveillance-supplemental-report-vol-25-1.pdf

Adults and Adolescents Living with Diagnosed HIV Infection, by Sex and Transmission Category, Year-end 2017—United States and 6 Dependent Areas

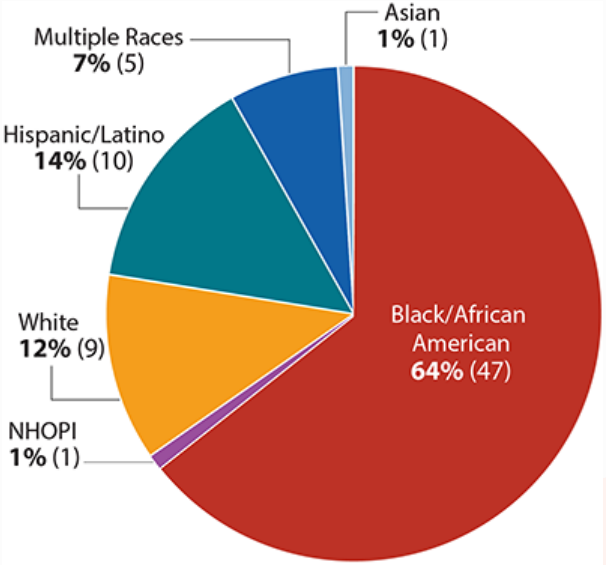


Note. Data have been statistically adjusted to account for missing transmission category. "Other" transmission category not displayed as it comprises 1% or less of cases.

[a] Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

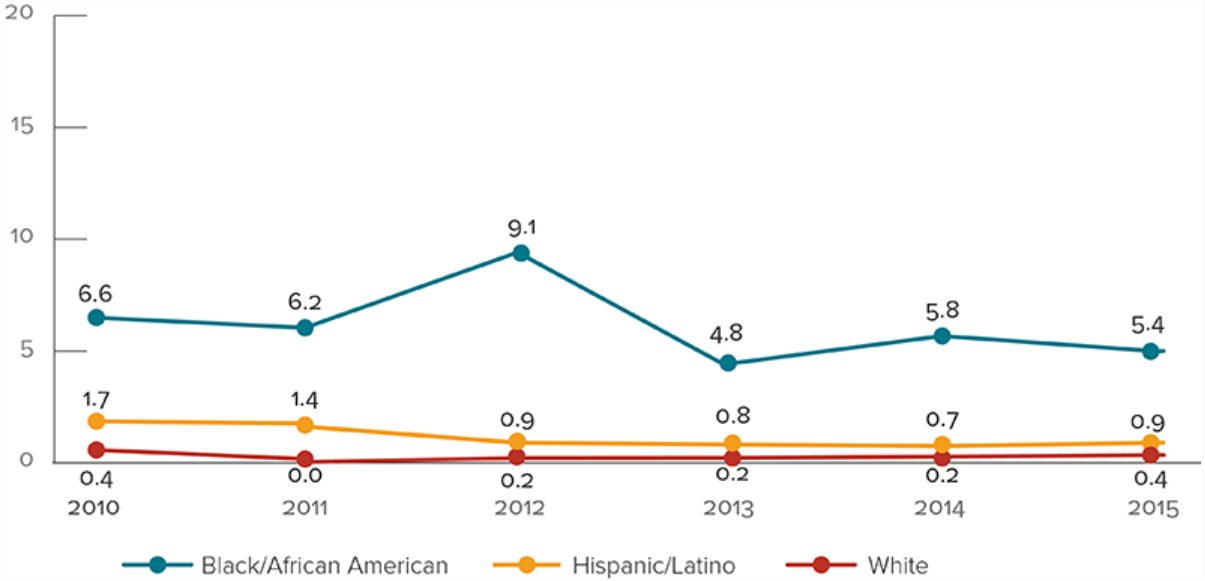
[b] Perinatal includes persons whose infections were attributed to perinatal transmission, but were aged 13 years and older at the end of 2017.

Diagnoses of Perinatal HIV Infections in the US and Dependent Areas by Race/Ethnicity, 2017



Source: CDC. Diagnoses of HIV infection in the United States and dependent areas pdf icon[PDF – 6 MB]. *HIV Surveillance Report* 2017;29. Hispanics/Latinos can be of any race.

Rates of Perinatally Acquired HIV Infections by Year of Birth and Mother's Race/Ethnicity, 2010-2015



Source: Monitoring selected national HIV prevention and care objectives by using HIV surveillance data—United States and 6 dependent areas, 2016 pdf icon[PDF – 2 MB]. *HIV Surveillance Supplemental Report* 2018;23(4).
Data include only persons born in the United States (50 states and District of Columbia). Data accounted for delays between birth and diagnosis, as well as between diagnosis and reporting.
Rates are per 100,000 live births.
Live-birth data reflect race/ethnicity of the infant's mother.
Hispanics/Latinos can be of any race.

Perinatal HIV transmission

- Without intervention for mother or baby, mother to child transmission of HIV occurs in 20-45% of births
- Dependent upon maternal viral load
  - 32% with VL>100k
  - 1% with VL<400
- With current interventions the rate of transmission can be <1%

Timing of transmission

- 10% in-utero, mostly in later pregnancy (only 1-2% earlier)
- 15% peripartum
- 10% postnatally (breastfeeding mostly)

Pediatric AIDS Clinical Trial Group (PACTG) 076

- Randomized, double-blind, placebo-controlled trial
- Non-breastfeeding mothers
- HIV-infected pregnant women 14-34wga, CD4 > 200
- Randomized to AZT antepartum (5 times daily, starting at 14-34wga), intrapartum, and for 6wks for child or not
- HIV transmission at 18mo was 8.3% in intervention group and 25.5% in the placebo group

Connor EM, et al. N Engl J Med. 1994; 331(18): 1173-80.

HIVNET 012

- Intrapartum and neonatal single dose NVP vs intrapartum and neonatal AZT (7d)
- Transmission was 11.8% vs 20% at 6-8 weeks

- Guay LA, et al. Lancet 1999; 354(9181): 795-802.

Perinatal HIV Prevention Trial 1 (PHPT-1)

- AZT from 28wks vs AZT from 35wks
- Neonatal AZT for 3d vs 6wks
- Short-short regimen 10.5% vs long-long 4.1%
- In utero transmission of 5.1% starting at 35wga, 1.6% when starting at 28wga
- No statistical difference between other regimens, but less in utero transmission with longer maternal treatment

Lallemant M, et al. N Engl J Med. 2000; 343(14): 982-91.

Petra Study

- Antepartum AZT + 3TC from 36wga, intrapartum AZT + 3TC, and postpartum AZT + 3TC for mother and infant x 7d
- Vs intrapartum and postpartum vs intrapartum only
- 6wk transmission rates were 5.7% vs 8.9% vs 15.2%

Petra Study Team. Lancet. 2002; 359(9313): 1178-86

Perinatal HIV Prevention Trial 2 (PHPT-2)

- AZT from 28wga and neonatal AZT for 7d after birth (unless the mother got <4wks AZT, then neonatal AZT for 4-6wks)
- Added single dose NVP to mother and child, mother only, or neither
- 1.9% vs 2.8% vs 6.3%

Lallemant M, et al. N Engl J Med. 2004; 351(3): 217-28.

Maternal ART recommendations

- In most cases, women who present for obstetric care on fully suppressive ARV regimens should continue their current regimens
- The decision about which ARV drugs to use during pregnancy should be made by a woman after discussing the known and potential benefits and risks to her and her fetus

https://aidsinfo.nih.gov/guidelines/html/3/perinatal/488/overview

Maternal ART recommendations

- Limited data on pregnancy outcomes among women on regimens other than DTG and EFV
- More than 2000 peri-conception exposures need to be monitored to rule out a 3-fold increase in rare events such as neural tube defects

https://aidsinfo.nih.gov/guidelines/html/3/perinatal/488/overview

Maternal ART Recommendations

- ABC/3TC or FTC/TDF or 3TC/TDF
- Insufficient data for TAF
- Preferred: ATV/r, DRV/r, DTG, and RAL
- Alternative: LPV/r, EFV, RPV
- Lower BMD documented in newborns of mothers on TDF

https://aidsinfo.nih.gov/guidelines/html/3/perinatal/488/overview

Dolutegravir versus efavirenz among women starting ART in late pregnancy

- DolPHIN-2 trial
- Pregnant, HIV-infected women in South Africa and Uganda
- Initiating ART in the 3rd trimester
- Randomized to DTG or EFV based therapy
- 268 women randomized – 135 to DTG and 133 to EFV
- Median 55 days of treatment prior to birth
- 74% of women on DTG had VL<50 vs 43% of women on EFV
- 3 perinatal infections, all felt to be in utero, all in the DTG group

Kintu K, et al. Lancet HIV. 2020; 7(5): 332-9.

Raltegravir versus Efavirenz among pregnant women

- ART naïve HIV-infected pregnant women in Argentina, Brazil, South Africa, Tanzania, Thailand, and the USA (most from Brazil)
- RAL or EFV with AZT/3TC bid
- 206 women on RAL, 202 on EFV
- 307 analyzed – missing VL, VL<200 at enrollment, resistance to study drugs (no resistance to INSTI was detected)
- 94% on RAL vs 84% on EFV had VL < 200 within 21 days of delivery
- 6/184 (3%) women on EFV had perinatal transmission vs 1/194 (1%) women on RAL – not statistically significant
- No difference in reported AE

Joao EC, et al. Lancet HIV. 2020; 7(5): 322-31.

Dolutegravir and pregnancy

- Botswana the first African country to shift to DTG-based ART
- Starting in 2012 treatment was EFV/FTC/TDF
- Starting in 5/2016 treatment was DTG-based
- 8 hospitals there collect infant exam data and ART exposure (Tsepamo Study)
- Midwives described all visible abnormalities and sought maternal consent to photo – photos reviewed by a medical geneticist blinded to ART exposure
- In 4/2018 more than expected neural tube defects in infants of mothers on DTG at conception
- Unplanned interim analysis

- Zash R, et al. N Engl J Med. 2018; 379: 979-81.

Dolutegravir and pregnancy

- As of 5/1/2018 there were 89,064 births included, 88,755 with an exam
- 86 with neural tube defects (0.1% of live births)
- 4 neural tube defects among 426 infants born women on DTG at conception (0.94%)
- 14 neural tube defects among 11,300 infants born to HIV-infected women on non-DTG ART at conception (0.12%)
- No neural tube defects among 2812 infants born to HIV-infected women started on DTG during pregnancy

- Zash R, et al. N Engl J Med. 2018; 379: 979-81.

Dolutegravir and pregnancy

- 10 hospitals added 7/2018 to 5/2019
- 72% of all births
- 8/15/2014 to 3/31/2019 – 119,477 total deliveries among surveillance sites, 119,033 available for analysis
- 28,723 mothers were HIV-positive
- 16,475 mothers with HIV had exposure to ART at conception
  - 1683 with exposure to DTG at conception
  - 14,792 with exposure to non-DTG ART at conception
- 3840 had DTG ART started during pregnancy
- 5952 had non-DTG ART started during pregnancy

- Zash R, et al. N Engl J Med. 2019; 381: 827-40.

Dolutegravir and pregnancy

- 98 total neural tube defects (0.08% of deliveries), 26 in stillbirths and 72 in live births
- 25% of live born children with neural tube defects died within 28 days

- Zash R, et al. N Engl J Med. 2019; 381: 827-40.

Dolutegravir and pregnancy

- 5 neural tube defects among 1683 deliveries for women on DTG at conception (**0.3%**; 95% CI 0.13 to 0.69%)
- 15 neural tube defects among 14,792 deliveries for women on non-DTG ART at conception (**0.1%**; 95% CI 0.06 to 0.17%)
- **Absolute difference in prevalence was 0.2% (95% CI 0.01 to 0.59%)**
- 1 neural tube defect among 3840 deliveries to mothers started on DTG during pregnancy (0.03%; 95% CI 0 to 0.15%)
- 70 neural tube defects among 89,372 deliveries to HIV-uninfected mothers (0.08%; 95% CI 0.06 to 0.10%)

- Zash R, et al. N Engl J Med. 2019; 381: 827-40.

Dolutegravir and pregnancy

- APR and EPPICC cohorts with 255 pregnancy outcomes with DTG exposure
- 158 in the first trimester
- 90% live births, 4.2% spontaneous abortions, 2.3% induced abortions
- Congenital anomalies in 2.7 and 4.9%, respectively
- Mostly polydactyly
- Not substantially more defects than other general population cohorts

- J Acquir Immune Defic Syndr. 2019; 81(4): 371-8.

Dolutegravir in pregnancy

- DTG is a preferred drug for pregnant women, irrespective of trimester
- DTG is an alternative drug for women trying to conceive

- https://aidsinfo.nih.gov/guidelines/html/3/perinatal/488/overview

Intrapartum AZT

- In PACTG 076 all women got AZT IV during labor
- French Perinatal Cohort - 11,538 deliveries to women with HIV between 1997 to 2010
- 95% of women got AZT IV
- Among women with VL>1000 at delivery
  - 7.5% in women not getting AZT
  - 2.9% in women getting AZT
  - No difference if infants were given intensified therapy
- Among women with VL<400 at delivery
  - 0% without AZT
  - 0.6% with AZT

Briand N, et al. Clin Infect Dis. 2013; 57(6): 903-14.

Cesarean section

- Review of cohort studies in the US and Europe
- 8533 mother-child pairs analyzed
- Adjusted for advanced maternal disease, low birth weight, and receipt of ARV
- Elective C-section associated with 0.43 odds of transmission (95% CI 0.33 to 0.56)
- Risk of transmission increased with rupture of membranes and the duration they had been ruptured

- The International Perinatal HIV Group. N Engl J Med. 1999; 340: 977-87.

Cesarean section

- Randomized controlled trial of elective C-section at 38wga
- Pregnant women with HIV infection between 34-36wga
- 436 women randomized
- 370 infants analyzed
- 3 of 170 infants born to women assigned to C-section infected (1.8%)
- 21 of 200 infants born to women assigned to vaginal delivery infected (10.5%)

- The European Mode of Delivery Collaboration. Lancet 1999; 353(9158): 1035-9.

Cesarean section and transmission in low mothers

- Prospective cohort study at University of Miami
- 1996-2008
- IV AZT infused throughout labor
- 1000 mother-infant pairs, 283 delivered by C-section
- Late prenatal care, no ART, and VL>1000 were associated with transmission
- No association of mode of delivery with transmission
- 493 women with VL<1000 and on combination ART with no transmission

- Cotter AM, et al. Am J Obstet Gynecol 2012; 207: 482-5.

Viral rebound in late pregnancy

- Retrospective cohort study in British Columbia
- 316 women included in the study
- 19 had viral rebound within 1mo of delivery
  - VL>50 after being undetectable earlier in pregnancy
- 6 had rebound to VL > 1000
- Associated with cocaine use, Aboriginal ethnicity, hepatitis C infection

- Boucoiran I, et al. Obstet Gynecol. 2017; 130(3): 497-501.

Intrapartum Care Recommendations

- Scheduled Cesarean delivery at 38wga is recommended for women with VL > 1000 or unknown VL near the time of delivery
- Scheduled Cesarean delivery solely for preventing HIV transmission is not recommended for women with VL < 1000
- IV AZT is recommended for women with VL > 1000 or unknown
- IV AZT is not required for women with VL<50
- IV AZT can be considered for women with VL between 50 and 999

- https://aidsinfo.nih.gov/guidelines/html/3/perinatal/180/intrapartum-antiretroviral-therapy-prophylaxis
- https://aidsinfo.nih.gov/guidelines/html/3/perinatal/182/transmission-and-mode-of-delivery

HIV-Exposed Infants

- 4 weeks of AZT prophylaxis can be given to infants of HIV-infected mothers on ART during pregnancy with a VL<50 near delivery
- Newborns at higher risk of perinatal HIV acquisition should initiate presumptive HIV therapy
  - If mother did not receive ARV
  - Received only intrapartum ARV
  - Received antepartum ARV but did not have a suppressed VL near delivery
  - Had primary HIV infection during pregnancy
  - Had primary HIV infection during breastfeeding

- https://aidsinfo.nih.gov/guidelines/html/3/perinatal/187/antiretroviral-management-of-newborns-with-perinatal-hiv-exposure-or-hiv-infection

HIV-exposed Infants – Low risk

- Very low risk of transmission for infants born to mothers on effective ART during pregnancy with VL suppression through delivery
- Cohort studies examining shorter courses of AZT
  - Irish cohort – 964 live-born infants, >50% vaginally delivered, 957 survived the first week of life and prescribed 4wks prophylaxis
    - AZT alone in 585 (61%), AZT/3TC in 64 (7%), and AZT/3TC/NVP in 308 (32%)
    - 906 not infected, 10 infected, 41 of indeterminate status (24 presumptively uninfected)
    - 6 of 10 infected infants had HIV RNA detected in the 1st week
    - 1 presumably low risk infant (mother VL 53 prior to delivery) had transmission
  - Hamburg cohort – 383 HIV-exposed infants, 321 at low risk for transmission
    - 137 got AZT x 2wks, 184 got AZT > 2 weeks
    - No transmission in the 2wk group, 1 infected infant in the >2wk group (4wks) – 0.5%

Ferguson W, et al. Pediatr Infect Dis J. 2011; 30(5): 408-12.
Nguyen TTT, et al. Pediatr Infect Dis J. 2019; 38(7): 727-30.

HIV-exposed infants – High risk

- Options for 3 drug therapy
  - AZT+3TC+NVP
  - AZT+3TC+RAL
- For those with positive HIV VL or HIV DNA PCR:
  - AZT dosing should be increased from 4mg/kg/dose bid to 12mg/kg/dose after 4wks of age
  - 3TC dosing should increase from 2mg/kg/dose bid to 4mg/kg/dose bid after 4wks
  - NVP dosing should increased from 6mg/kg/dose bid to 200mg/m2/dose bid after 4wks
  - RAL dosing should be increased from 1.5mg/kg/dose bid to 3mg/kg/dose bid after 1wk and then to 6mg/kg/dose after 4wks

- https://aidsinfo.nih.gov/guidelines/html/3/perinatal/187/antiretroviral-management-of-newborns-with-perinatal-hiv-exposure-or-hiv-infection

HIV-exposed infants – High risk

- No trials to comparing presumptive ART with single drug or 2-drug prophylaxis
- Presumptive therapy is often discontinued if birth HIV NAT results are negative and AZT alone is continued for a 6wk course
- Multiple studies showing patients with perinatally-acquired HIV started on ART early have smaller viral reservoirs
- Aggressive 3-drug treatment is congruent with PEP and has a low risk for serious AE

- https://aidsinfo.nih.gov/guidelines/html/3/perinatal/187/antiretroviral-management-of-newborns-with-perinatal-hiv-exposure-or-hiv-infection

HPTN 040/PACTG 1043

- Infants born to HIV-infected women who had not received ART prior to labor
- Randomized to AZT x 6wks vs AZT x 6wks + 3 doses of NVP over 8d vs AZT x 6wks + NFV and 3TC x 2wks
- Among infants testing negative for HIV at birth, transmission rates were 4.8% vs 2.2% vs 2.4%
- Higher rates of neutropenia with AZT + NVP + NFV

Nielsen-Saines K, et al. N Engl J Med. 2012; 366(25): 2368-79.

Mississippi Baby

- Infant born at 35wga to a HIV-infected mother who had received no prenatal care
- HIV testing was positive during labor
- Delivered prior to any antiretroviral prophylaxis being given
- Maternal VL 2423
- Child started on presumptive ART at 30hrs old

Persaud D, et al. N Engl J Med. 2013; 369(19): 1828-35.

Mississippi Baby

- HIV DNA PCR on infant at 30hrs was positive
- HIV VL at 31hrs on infant was 19,812
- HIV VL at 6d on infant was 2617
- HIV VL at 11d on infant was 516
- HIV VL<48 at 29d
- Remained undetectable
- ART inadvertently stopped at 18mo with missed clinic visits
- HIV VL not detected at 23 and 24mo, HIV DNA PCR negative at 24mo, HIV Ab test negative at 24mo

Persaud D, et al. N Engl J Med. 2013; 369(19): 1828-35.

Mississippi Baby

- Remained negative but then had virologic rebound at 46mo to VL 17k

- Luzuriaga K, et al. N Engl J Med. 2015; 372(8): 786-8.

Breastfeeding

- Breastfeeding reduces mortality among HIV-exposed infants in resource-limited settings
- Mixed feeding is associated with increased risk for HIV transmission
- Without ART for women or infants, breastfeeding is associated with 1.6-17% transmission rates (varies by CD4)
- Women on continued ART have less risk of transmitting HIV at 12mo than those just getting peripartum prophylaxis (5.4 vs 9.5%)
- ART during breastfeeding reduces the risk of transmission (1.1%)
- Transmission has been documented from women with undetectable viral loads

Breastfeeding, Antiretrovirals, and Nutrition (BAN) study

- Randomized controlled trial among pregnant HIV-infected women in Malawi
- All mothers and infants got single dose nevirapine
- All mothers got AZT/3TC bid for 7d after birth
- All infants got AZT/3TC bid x 7d
- Exclusive breastfeeding with rapid weaning at 28wks
- 2369 mothers and their infants, 1898 completed 48wk follow up
- Maternal ART (AZT/3TC + NVP or NFV or LPV/r) vs infant NVP daily vs no other treatment

Jamieson DJ, et al. Lancet. 2012; 379(9835): 2449-58.

Breastfeeding, Antiretrovirals, and Nutrition (BAN) study

- HIV infection in 10% vs 8% vs 12% of infants, respectively at 48wks
- HIV transmission occurred after 2wks in 4% vs 4% vs 7%, respectively, at 48wks, 1/3 after reported weaning
- HIV infection or death occurred in 12% vs 11% vs 15% of infants, respectively, at 48wks
- Maternal age and CD4<350 were associated with transmission
- Serious adverse events occurred at a rate of 1.1 per 100 person weeks after 28wks, with > half of the deaths after 28wks, mostly from diarrhea

- Jamieson DJ, et al. Lancet. 2012; 379(9835): 2449-58.

Effect of extended breastfeeding

- Weaning at 4-6 months associated with mortality and severe gastroenteritis
- Continued breastfeeding beyond this time frame has been associated with reduced infant mortality

Taha TE, et al. Clin Infect Dis. 2011; 53(4): 388-95.
Kafulafula G, et al. J Acquir Immune Defic Syndr. 2010; 53: 6-13.
Onyango-Makumbi C, et al. J Acquir Immune Defic Syndr. 2010; 53: 20-7.
Homsy J, et al. J Acquir Immune Defic Syndr. 2010; 53: 28-35.

IMPAACT PROMISE study

- HIV-1 infected women with CD4>350 and their breastfeeding HIV-uninfected infants
- Randomized at 6-14d to maternal ART or infant NVP for 18mo post-partum
- 2431 mother-infant pairs
- Breastfeeding through > 12mo (median 16mo)
- Infant HIV-free survival of 97.1% vs 97.7% at 24 months

- Flynn PM. J Acquir Immune Defic Syndr. 2018; 77(4): 383-92.

Premastication of Food

- Common practice
- 31% of caregivers of HIV-perinatally-exposed children
- 14% of infant caregivers in the US overall
- Case control studies have not shown a clear link
- HIV transmission shown to be likely by this means in a case series of 3 patients that included phylogenetic analysis

Gaur AH, et al. Pediatrics. 2009; 124(2): 658-66.
Centers for Disease Control and Prevention (CDC). MMWR Morb Mortal Wkly Rep. 2011; 60(9): 273-5.

Putting it all together

Risk of perinatal transmission with ART

- French Perinatal Cohort (ANRS CO1/CO11)
- 90 perinatal centers throughout France
- 95% of HIV-infected pregnant women at each center participating by informed consent
- Breastfeeding women excluded
- Women not getting 3-drug ART excluded
- 12,284 mother-infant pairs from 2000 to 2011 with 8678 eligible for the study (exclusions for HIV-2, overseas sites, no ART in pregnancy, NRTI mono- or dual therapy, and breastfeeding)

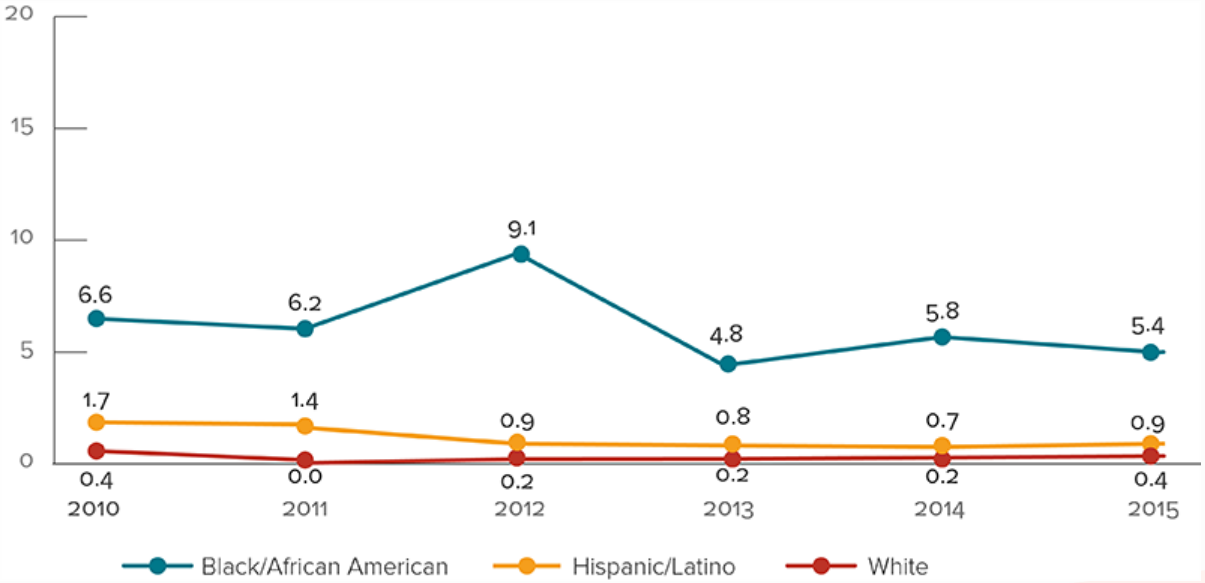
Mandelbrot L, et al. Clin Infect Dis. 2015; 61(11): 1715-25.

Risk of perinatal transmission with ART

Maternal VL .	Timing of ART Initiation .								*P* Value .
	Before Conception[a] .		1st Trimester (<14 wk) .		2nd Trimester (14–27 wk) .		3rd Trimester (≥28 wk) .		
	PT, % (95% CI) .	No. With PT/Total No. .	PT, % (95% CI) .	No. With PT/Total No. .	PT, % (95% CI) .	No. With PT/Total No. .	PT, % (95% CI) .	No. With PT/Total No. .	
Maternal VL nearest delivery, copies/mL									
≥400	2.2 (.7–5.0)	5/230	1.5 (.04–7.8)	1/69	2.4 (1.0–4.9)	7/291	4.4 (2.1–7.9)	10/228	.37
50–400	0.3 (.01–1.8)	1/301	1.6 (.04–8.8)	1/61	1.4 (.5–2.8)	7/515	3.0 (1.4–5.7)	9/297	.06
Undetectable, threshold >50	0.0 (0–1.7)	**0/212**	0.0 (0–6.8)	0/52	0.6 (<.01 to 3.3)	1/169	0.0 (0–8.6)	0/41	.5
<50	0.0 (0–.1)	**0/2651**	0.2 (<.01 to 1.1)	1/507	0.5 (.2–1.0)	9/1735	0.9 (.2–2.3)	4/452	.002
Missing VL	…	0/111	…	0/20		0/100	…	0/33	…
Undetermined child HIV status	…	…/287	…	…/55	…	…/184	…	…/77	…

Mandelbrot L, et al. Clin Infect Dis. 2015; 61(11): 1715-25.

Rates of Perinatally Acquired HIV Infections by Year of Birth and Mother's Race/Ethnicity, 2010-2015



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Data include only persons born in the United States (50 states and District of Columbia). Data accounted for delays between birth and diagnosis, as well as between diagnosis and reporting.
Rates are per 100,000 live births.
Live-birth data reflect race/ethnicity of the infant's mother.
Hispanics/Latinos can be of any race.

Missed Opportunities

- Retrospective cohort of births to women with HIV in Florida 2007-14
- 4337 singleton births with 70 perinatal infections (1.6%)
- 1/3 of mothers used illegal drugs or acquired a STI during pregnancy
- 5.66-fold (95% CI 2.31-13.91) relative risk for perinatal transmission for women diagnosed with HIV during labor and delivery
- 26.5-fold (95% CI 15.44-45.49) for mothers diagnosed after birth
- 12 had acute HIV during pregnancy, 6 with no prenatal care

Trepka MJ, et al. South Med J. 2017; 110(2): 116-28.

Missed Opportunities

- Retrospective cohort study
- New York HIV-exposed births from 2002-6
- 3396 HIV-exposed infants, 3102 with data, 65 infected children (2.1%)
- 3.24-fold (95% CI 1.15-8.15) increased risk of transmission for women diagnosed with HIV at delivery
- 13.19-fold (95% CI 3.98-56.3) increased risk for women who acquired HIV during pregnancy

Birkhead GS, et al. Obstet Gynecol. 2010; 115: 1247-55.