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Preventing Perinatal HIV Transmission

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Module 5: Prevention of HIV
Lesson 1: Preventing Perinatal HIV Transmission

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Overview

Risk of Perinatal HIV Transmission

The World Health Organization estimates that nearly 10 million cases of perinatal HIV transmission have occurred globally since the beginning of the HIV epidemic, with most of these in resource-poor settings.[1] In the United States, the annual number of perinatal HIV infections peaked at 1,650 cases in 1991.[2,3] Since 2017, the number of perinatal HIV infections in the United States has been fewer than 100 cases per year (Figure 1).[4] In the United States, on an annual basis, approximately 3,000 pregnant women with HIV give birth.[4,5] For pregnant women with HIV, the estimated rate of perinatal transmission of HIV in the absence of any HIV prevention intervention is approximately 25%; among children who acquire HIV perinatally, about 20% of the transmission events occur before 36 weeks of gestation, 50% between 36 weeks and delivery, and 30% during active labor and delivery.[6,7] With the use of suppressive combination antiretroviral therapy during pregnancy, followed by postnatal infant antiretroviral prophylaxis (and with the judicious use of elective cesarean section and the avoidance of breastfeeding), the current rate of perinatal HIV transmission rate in the United States is less than 1%.[8,9,10]

Impact of Antiretroviral Therapy on Perinatal HIV Transmission

- **Impact of Zidovudine Monotherapy**: In 1994, the landmark Pediatric AIDS Clinical Trials Group (PACTG) 076 trial established that a three-part zidovudine regimen reduced perinatal HIV transmission by 67.5% when compared with placebo (Figure 2).[6] In this trial, the three-part regimen consisted of (1) oral zidovudine initiated at 14 to 34 weeks of gestation and continued throughout pregnancy, (2) intravenous zidovudine given during labor and delivery, and (3) oral zidovudine given to the newborn for 6 weeks. The HIV transmission rate (determined at 18 months after birth) was 8.3% in the three-part zidovudine group compared to 25.5% in the placebo group.[6] Later that year, the U.S. Public Health Service (USPHS) issued guidelines recommending the use of zidovudine to reduce perinatal HIV transmission. The PACTG study and the subsequent USPHS recommendations spurred a dramatic decline in the number of cases of HIV perinatal transmission during the 1990s in the United States.[11]
- **Timing of Zidovudine Monotherapy**: In a retrospective study conducted in 1995-1997, investigators analyzed the relative benefit of zidovudine prophylaxis for the prevention of perinatal transmission of HIV based on the timing of when the zidovudine was administered.[12] The greatest transmission benefit was seen with zidovudine therapy during pregnancy, but some benefit occurred even when zidovudine was administered later—as intravenous therapy in the intrapartum period or as oral therapy for the infant within 48 hours of birth (Figure 3).[12]

- **Impact of Combination Antiretroviral Therapy**: Clinical trials and observational studies in the United States, as well as clinical trials have demonstrated that a variety of antiretroviral regimens started in the prenatal period markedly reduce the risk of perinatal HIV transmission, with the greatest reduction in transmission occurring with use of combination antiretroviral therapy (Figure 4).[11,13,14,15]

Information and Consultation Resources

This topic review will highlight key points from the Perinatal HIV Clinical Guidelines.[16] The full text of the Perinatal HIV Clinical Guidelines should be consulted for all management decisions and for further reading. In addition, expert consultation can be obtained by calling the National Clinician Consultation Center's Perinatal HIV/AIDS Line at (888) 448-8765; this free resource provides information and clinical consultation to medical providers caring for pregnant women with HIV and their infants.

HIV Testing During Pregnancy

Routine HIV Testing in Pregnancy

Multiple organizations strongly recommend routine opt-out HIV testing for all pregnant women and this should be done as early as possible in the pregnancy.[17,18,19,20] The recommendation to test all pregnant women for HIV applies to persons presenting at any stage of pregnancy, including during labor.[17] This recommendation is grounded in data that knowledge of HIV status during pregnancy provides an opportunity to (1) administer antiretroviral therapy to persons with HIV during pregnancy, (2) optimize strategies during delivery to minimize transmission risk, (3) give post-delivery antiretroviral therapy to the newborn, and (4) counsel on avoiding breastfeeding—all of which markedly reduce the risk of perinatal HIV transmission. In addition, the partners of all pregnant women should undergo testing for HIV if their status is unknown.[17] Maternal HIV test results should be communicated to the newborn's medical provider and documented in the newborn's chart.[17]

Repeat Testing During Pregnancy

It is also important to remember that pregnant women with a negative HIV test result in the first trimester of pregnancy should undergo repeat HIV testing in the third trimester if they have increased risk for HIV acquisition.[17,18] Risk factors that warrant repeat testing in the third trimester include those who have a sex partner with HIV with has a detectable (or unknown) HIV RNA level, those receiving care in facilities that have an HIV incidence of at least 1 case per 1,000 pregnant women per year, those who reside in jurisdictions with elevated HIV incidence, and those who reside in states that mandate third-trimester testing.[17] In addition, repeat third trimester HIV testing should be performed if a pregnant woman has a suspected or confirmed diagnosis of a sexually transmitted infection (STI).[17] Individuals with a confirmed STI and a confirmed negative HIV test should be referred for HIV preexposure prophylaxis (PrEP). Further, any pregnant or breastfeeding woman who presents with symptoms suggestive of acute HIV should have prompt diagnostic evaluation for acute HIV with an HIV-1/2 antigen antibody test and an HIV RNA, even if they have previously undergone HIV testing during the pregnancy.[17,21] Pregnant women who present in labor with unknown HIV status (or who are at high risk for HIV acquisition but have not undergone repeat third-trimester HIV testing), should have an expedited HIV test (i.e., results available within 1 hour) performed during labor. If that is not feasible, then expedited HIV testing should be done in the immediate postpartum period.[17]

Antepartum Management

Indications for Antiretroviral Therapy in Pregnancy

The Perinatal HIV Clinical Guidelines recommend using combination antiretroviral therapy for all pregnant women with HIV, regardless of CD4 count or HIV RNA level, to decrease the risk of perinatal HIV transmission and to benefit the pregnant woman's health.[15,22,23] All instances of antiretroviral exposure during pregnancy should be reported online to the Antiretroviral Pregnancy Registry. The risk of perinatal HIV transmission increases with higher maternal plasma HIV RNA levels, but transmission can occur in pregnant women who have low plasma HIV RNA levels.[24] Therefore, even pregnant women with a low plasma HIV RNA level should receive antiretroviral therapy. Regardless of antiretroviral therapy use, pregnant women with HIV may be at risk for adverse outcomes, such as hypertensive pregnancy disorders or neonatal complications, including preterm delivery, low birth weight infants, or stillbirth.

Timing of Initiating Antiretroviral Therapy in Pregnancy

Due to the overwhelming benefits of antiretroviral therapy in preventing perinatal HIV transmission, the Perinatal HIV Clinical Guidelines recommend that all women with HIV who become pregnant and are not receiving antiretroviral therapy should start antiretroviral therapy without delay.[22] Prior to starting antiretroviral therapy, HIV genotypic drug-resistance testing should be ordered, but treatment should not be delayed while waiting for the drug resistance test results; the antiretroviral regimen can subsequently be modified if needed, based on the HIV drug resistance test results.[22] Given that approximately 50% of perinatal transmissions occur between 36 weeks and the time of birth, intense efforts are warranted to lower HIV RNA levels as much as possible prior to the delivery, even for those individuals who are diagnosed with HIV late in pregnancy.[1,7]

Recommended Regimens in Treatment-Naïve Pregnant Women

The Perinatal HIV Clinical Guidelines provide recommendations for initial combination regimens for antiretroviral-naïve pregnant women that include four categories: preferred, alternative, insufficient data, and not recommended.[25]

Preferred Regimens for Use as Initial Antiretroviral Therapy in Pregnancy

The preferred antiretroviral regimens for pregnant women who have not previously received antiretroviral therapy or cabotegravir or HIV PrEP consist of a dual nucleoside reverse transcriptase inhibitor (NRTI) backbone combined with the anchor drug dolutegravir—an integrase strand transfer inhibitor (INSTI).[25] The preferred dual NRTIs are: tenofovir DF plus either emtricitabine or lamivudine; tenofovir alafenamide plus either emtricitabine or lamivudine; or abacavir plus lamivudine.[25] Note that dolutegravir is preferred as the anchor drug if the patient has not had prior use of injectable cabotegravir.[25] In contrast, for individuals who have previously been exposed to injectable cabotegravir, the preferred anchor drug is the protease inhibitor (PI) ritonavir-boosted darunavir; this recommendation is based on concern about possible INSTI resistance in the setting of HIV acquisition during prior cabotegravir exposure for HIV PrEP.[25]

Table 1. **Perinatal Guidelines: Recommendations for Use of Antiretroviral Drugs During Pregnancy**

***Preferred* Initial Regimens in Pregnancy**

Drugs or drug combinations are designated as *Preferred* for therapy during pregnancy when clinical trial data in adults have demonstrated efficacy and

durability with acceptable toxicity and ease of use, and pregnancy-specific pharmacokinetic data are available to guide dosing. In addition, the available data must suggest a favorable risk-benefit balance for the drug or drug combination compared to other antiretroviral drug options; the assessment of risks and benefits should incorporate outcomes for maternal, pregnancy, fetal, and infant outcomes. Some *Preferred* drugs or regimens may have minimal toxicity or teratogenicity risks that are offset by other advantages for women with HIV who are pregnant or who are trying to conceive. Therefore, it is important to read all the information on each drug in the *Perinatal Guidelines* before administering any of these medications to patients.

***Preferred* Dual-NRTI Backbones**	**Advantages**	**Disadvantages**
Abacavir-lamivudine	• Once-daily dosing • Available as a fixed-dose combination • Well-tolerated during pregnancy • Reassuring PK data during pregnancy	• Requires HLA-B*5701 testing before u Abacavir **should not be used** in pati who test positive for HLA-B*5701 beca of the risk of developing a hypersensitivity reaction. Requires education about hypersensitivity reactions. • Abacavir is not active against HBV. • Abacavir-lamivudine administered wit atazanavir boosted with ritonavir or efavirenz is not recommended if pretreatment HIV RNA is >100,000 copies/mL. • Abacavir is not recommended as part regimens for initial treatment of acute

		HIV infection unless the patient previously tested negative for the HLA B*5701 gene variant; using tenofovir or tenofovir alafenamide rather than abacavir will avoid delays in initiating antiretroviral therapy while awaiting H B*5701 test results.
Tenofovir alafenamide-emtricitabine *or* Tenofovir alafenamide plus lamivudine	• Once-daily dosing • Available as a fixed-dose combination • Reassuring PK data and extensive use during pregnancy; no dose adjustment required in pregnancy • Both NRTI combinations active against HBV • Minimal toxicity compared with zidovudine-lamivudine • When combined with dolutegravir, the efficacy and toxicity of tenofovir alafenamide-emtricitabine and tenofovir DF-emtricitabine for treatment of pregnant women are similar, but tenofovir alafenamide-emtricitabine is associated with fewer adverse birth outcomes and less risk of insufficient weight gain in pregnancy.	• When combined with dolutegravir, tenofovir alafenamide-emtricitabine is associated with more treatment-emergent obesity in nonpregnant adu women compared to tenofovir DF-emtricitabine. (Notably, the impact on weight gain in pregnancy may be beneficial, as noted in the Advantages column.)
	• Once-daily dosing • Available as a fixed-dose combination • Reassuring PK data and extensive use during pregnancy; no dose adjustment required in pregnancy • Both NRTI combinations active against HBV • When combined with dolutegravir, the efficacy and toxicity of tenofovir alafenamide-emtricitabine and tenofovir DF-emtricitabine for treatment of pregnant women are similar.	
Tenofovir DF-emtricitabine *or* Tenofovir DF plus lamivudine		• Potential concerns about fetal bone ar early-life growth abnormalities with tenofovir DF, although clinical findings are reassuring to date • Tenofovir DF has potential renal toxici thus, tenofovir DF-based, dual-NRTI combinations should be used with cau in patients with renal insufficiency.
***Preferred* INSTI Regimens**	**Advantages**	**Disadvantages**
Dolutegravir-ab	• Once-daily dosing • Dolutegravir-abacavir-lamivudine is available as a fixed-dose combination.	• Potential concerns about excess weig gain with dolutegravir • Dolutegravir-abacavir-lamivudine

acavir-l amivudi ne *or* Doluteg ravir plus a *Preferre d* Dual-NRTI Ba ckbone	• Sufficient data about PK, efficacy, and safety of dolutegravir in pregnancy • High rates of viral suppression • Dose adjustments during pregnancy are not needed. • May be particularly useful when drug interactions or the potential for preterm delivery with a PI-based regimen are a concern. • Dolutegravir has been shown to rapidly decrease viral load in ARV-naive pregnant women who present to care later in pregnancy. In nonpregnant adults, dolutegravir is associated with lower rates of INSTI resistance than raltegravir, and dolutegravir allows for once-daily dosing; for these reasons, dolutegravir is particularly useful for pregnant women presenting late in pregnancy. • Dolutegravir with a NRTI backbone of (tenofovir alafenamide or tenofovir DF) with (lamivudine or emtricitabine) is the *Preferred* regimen for initial treatment in women with early (acute or recent) HIV infection in women without a history of cabotegravir exposure for PrEP.	requires HLA-B*5701 testing before us (see abacavir-lamivudine above). • Specific timing and/or fasting recommendations apply if dolutegravi taken with calcium or iron (e.g., in prenatal vitamins. • Dolutegravir is not *Preferred* for initial treatment in women with early (acute recent) HIV infection and a history of cabotegravir exposure for PrEP due to concerns about INSTI resistance mutations; darunavir boosted with ritonavir is *Preferred* in this situation.
***Preferr ed* PI R egime ns (only with prior e xposur e to lo ng-acting injecta ble cab otegra vir)**	**Advantages**	**Disadvantages**
Daruna vir boosted with rit onavir plus a *Preferre d* Dual-NRTI Ba ckbone	• Darunavir boosted with ritonavir is a Preferred PI only in persons with previous exposure to long-acting injectable cabotegravir. In all other circumstances, darunavir boosted with ritonavir is an alternative)	• Not available as a fixed-dose combina • Requires twice-daily dosing during pregnancy • Requires administration with food • PIs may increase the risk of preterm b

Abbreviations: NRTI = nucleoside reverse transcriptase inhibitor; INSTI = integrase strand transfer inhibitor; PI = protease inhibitor; ARV = antiretroviral; PK = pharmacokinetics; PrEP = preexposure prophylaxis

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum Care. Recommendations for use of

antiretroviral drugs during pregnancy. Table 6. What to start: initial antiretroviral regimens during pregnancy for women who are antiretroviral-naive. January 31, 2024. [HIV.gov]

Alternative Regimens for Use as Initial Antiretroviral Therapy in Pregnancy

The following table summarizes the recommendations for alternative initial regimens in pregnancy.

Table 2. **Perinatal Guidelines: Recommendations for Use of Antiretroviral Drugs During Pregnancy**

Alternative Initial Regimens in Pregnancy

Drugs or drug combinations are designated as *Alternative* options for therapy during pregnancy when clinical trial data in adults show efficacy and the data in pregnant women are generally favorable, but limited. Most *Alternative* drugs or regimens are associated with more PK, dosing, tolerability, formulation, administration, or interaction	

concerns than those in the category, but they are acceptable for use in pregnancy. Some *Alternative* drugs or regimens may have known toxicity or teratogenicity risks that are offset by other advantages for women with HIV who are pregnant or who are trying to conceive. Therefore, it is important to read all the information on each drug in the *Perinatal Guidelines* before administering any of these medications to patients.			
***Alternative* INSTI**	**Advantages**	**Disadvantages**	

Regimens		
Bictegravir-tenofovir alafenamide-emtricitabine	• Coformulated as a single, once daily pill • High barrier to resistance • No food requirement • No dose adjustment required in pregnancy • No safety concerns observed • High rates of viral suppression	• PK and safety dat small studies. Dru woman who is in than in nonpregna are reduced in lat for bictegravir tha levels remained a are anticipated to • May be associate • Specific timing an apply if bictegrav (e.g., in prenatal
Raltegravir plus a *Preferred* Dual-NRTI Backbone	• Reassuring safety data • No safety concerns observed. Raltegravir may be particularly useful when drug interactions or the potential for preterm delivery with PI-based regimens are a concern. • PK data are available for raltegravir in pregnancy when using the twice-daily formulation (400 mg twice daily). • Like dolutegravir, raltegravir has been shown to rapidly decrease viral load in ARV-naive pregnant women who present to care later in pregnancy. In nonpregnant adults, dolutegravir is associated with lower rates of INSTI resistance than raltegravir, and dolutegravir permits once-daily dosing; for these reasons, dolutegravir is *Preferred* and raltegravir is *Alternative* for use during pregnancy.	• Twice-daily dosin due to low drug le during pregnancy • Not available as a • Lower barrier to r this reason, ralteg pregnancy • PK data are not a mg (2 x 600 mg) (raltegravir HD) in • Specific timing an apply if raltegravi (e.g., in prenatal
***Alternative* PI Regimens**	**Advantages**	**Disadvantages**
Atazanavir boosted with ritonavir plus a *Preferred* Dual-NRTI Backbone	• Once-daily dosing • Extensive experience during pregnancy	• Not available as a • Associated with in bilirubin levels, w the risk of neonat clinically significa kernicterus report monitoring is reco • Requires increase trimester • Has been associa reductions in lang and late language • PIs may increase • Cannot be used w • Requires consider H2 blockers, whic pregnancy.
Darunavir boosted with ritonavir plus a *Preferred* Dual-NRTI Backbone	• When a protease inhibitor-based regimen is indicated, darunavir boosted with ritonavir is recommended over atazanavir. However, darunavir boosted with ritonavir requires twice-daily dosing in pregnancy, and dosing frequency affects adherence. For that reason, when use of a PI-based	• Not available as a • Requires twice-da • Requires adminis • PIs may increase

	regimen is indicated during pregnancy, some Panel members would use atazanavir boosted with ritonavir rather than darunavir boosted with ritonavir for ART. • Darunavir boosted with ritonavir with a NRTI backbone of tenofovir alafenamide or tenofovir DF with lamivudine or emtricitabine is the *Preferred* regimen for initial treatment in women with a history of CAB-LA exposure for HIV PrEP.	
***Alternative* NRTI Regimens**	**Advantages**	**Disadvantages**
Zidovudine-lamivudine	• Available as a fixed-dose combination • Significant experience during pregnancy	• Requires twice-da • Associated with h including nausea, maternal and neo • Other regimens h greater efficacy a
***Alternative* NNRTI Regimens**	**Advantages**	**Disadvantages**
Efavirenz-tenofovir DF-emtricitabine *or* Efavirenz-tenofovir DF-lamivudine *or* Efavirenz plus a *Preferred* Dual-NRTI Backbone	• Once-daily dosing • Available as a fixed-dose combination • Extensive experience in pregnancy • Not associated with increased risk of neural tube defect or other congenital anomalies in human studies (although cautionary text based on animal studies remains in the package insert. • No dose changes are required during pregnancy. • Useful for patients who require treatment with drugs that have significant interactions with *Preferred* agents or who need the convenience of a coformulated, single-tablet, once-daily regimen and are not eligible for dolutegravir.	• Overall higher rat some *Preferred* d • Requires enhance suicidality • Increased risk of observed with efa versus dolutegrav emtricitabine star • Increased risk of fatigue, hepatoto
Rilpivirine-tenofovir DF-emtricitabine or Rilpivirine-tenofovir alafenamide-emtricitabine Rilpivirine (oral) plus a *Preferred* Dual-NRTI Backbone	• Once-daily dosing • Available as a fixed-dose combination • Useful for patients who require treatment with drugs that have significant interactions with *Preferred* agents or who need the convenience of a coformulated, single-tablet, once-daily regimen and are not eligible for dolutegravir	• Limited use for in HIV RNA. Rilpiviri patients with pret copies/mL or CD4 • Requires close vi trimesters becaus levels. Insufficien • Do not use with p • Requires consider H2 blockers or pr commonly used d • Requires adminis
Abbreviations: NRTI = nucleoside reverse transcriptase inhibitor; INSTI = integrase strand transfer inhibitor; PI = p antiretroviral; PK = pharmacokinetics; PrEP = preexposure prophylaxis		

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum Care. Recommendations for use of antiretroviral drugs during pregnancy. Table 6. What to start: initial antiretroviral regimens during

pregnancy for women who are antiretroviral-naive. January 31, 2024. [HIV.gov]

Insufficient Data for Use as Initial Antiretroviral Regimens in Pregnancy

The following table summarizes regimens for which there are insufficient data in pregnancy to recommend routine use in initial regimens.

Table 3. **Perinatal Guidelines: Recommendations for Use of Antiretroviral Drugs During Pregnancy**

***Insufficient Data* for Use as Initial Regimens in Pregnancy**

These drugs and drug combinations are approved for use in adults, but pregnancy-specific PK or safety data are too limited to make recommendations for use in pregnant women. When a pregnant woman presents to care while virally suppressed on one of these drugs or drug combinations, providers should consider whether to continue their current regimen or switch to a recommended antiretroviral regimen.

Insufficient Data	Advantages	Disadvantages
Doravirine *or* Doravirine-tenofovir DF-lamivudine	• Coformulated with tenofovir DF-lamivudine as single table • No food requirement	• Limited PK, toxici • Initial studies sug in third trimester.

Abbreviations: PK = pharmacokinetic

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum Care. Recommendations for use of antiretroviral drugs during pregnancy. Table 6. What to start: initial antiretroviral regimens during pregnancy for women who are antiretroviral-naive. January 31, 2024. [HIV.gov]

Not Recommended for Use as Initial Antiretroviral Regimens in Pregnancy

There are some antiretroviral regimens that are not recommended for initial antiretroviral therapy in pregnancy and not recommended for initial use in pregnancy due to lower virologic efficacy, safety concerns, or because they are also not recommended as initial antiretroviral options in non-pregnant adults.[25]

Table 4. **Perinatal Guidelines: Recommendations for Use of Antiretroviral Drugs During Pregnancy**

***Not Recommended* for Use as Initial Regimens in Pregnancy**

Drugs and drug combinations listed in this category

are *Not Recommended* for use in pregnancy because of inferior virologic efficacy or potentially serious safety concerns for the pregnant woman or fetus or because they are not recommended for initial therapy in non-pregnant adults. This category includes drugs or drug combinations for which PK data demonstrate low drug levels and			

risk of viral rebound during pregnancy. Levels of these drugs are often low in late pregnancy (during the second and third trimesters), when risk for perinatal transmission is high if viremia in the pregnant woman occurs.			

Not Recommended	**Advantages**	**Disadvantages**
Atazanavir-cobicistat		• Limited existing d both cobicistat ar trimesters. • Changing cobicist to improve efficac
Long-Acting Injectable cabotegravir plus rilpivirine (Co-packaged Formulation)	• Injectable delivery may be more effective and/or more convenient than oral antiretroviral therapy for some patients. • Approved for nonpregnant adults who have RNA levels <50 copies/mL for at least 3 months on a stable oral ARV regimen, with no history of treatment failure and no known or suspected resistance	• Limited PK, toxicit pregnancy • Not recommende antiretroviral-naiv or nonpregnant) • Due to the long h and rilpivirine, dru months after the switch to an oral
Darunavir-cobicistat	• Darunavir-cobicistat-tenofovir alafenamide-	• Limited existing d

or Darunavir-cobicistat-tenofovir alafenamide-emtricitabine	emtricitabinee is coformulated as single-tablet, once-daily regimen	both cobicistat ar trimesters; viral b reported. • Changing cobicist to improve efficac addition to adding darunavir and rito
Elvitegravir-cobicistat-tenofovir alafenamide-emtricitabine *or* Elvitegravir-cobicistat-tenofovir DF-emtricitabine	• Coformulated as single-tablet, once-daily regimen	• Limited existing d both cobicistat ar trimesters. • Viral breakthroug 26% of individual insufficient to sug • Unlike for daruna cobicistat, there i with ritonavir boo • Specific timing ar apply, especially in prenatal vitami
Abbreviations: ARV = antiretroviral; PK = pharmacokinetic		

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum Care. Recommendations for use of antiretroviral drugs during pregnancy. Table 6. What to start: initial antiretroviral regimens during pregnancy for women who are antiretroviral-naive. January 31, 2024. [HIV.gov]

Women on Antiretroviral Therapy Who Become Pregnant

In most circumstances, if a woman with HIV is taking a fully suppressive combination antiretroviral regimen and becomes pregnant, she should continue the current antiretroviral regimen; discontinuing therapy could cause a viral rebound that could increase the risk of HIV transmission to the fetus.[26] There are several medications or regimens that require special consideration, including some that may require discontinuation.[26,27] The Perinatal HIV Clinical Guidelines provide detailed situation-specific recommendations for the use of antiretroviral drugs in pregnant women and nonpregnant women who are trying to conceive.[27] The following summarizes recommendations for several of these key recommendations.

- **Injectable Cabotegravir-Rilpivirine**: Data for the use of injectable cabotegravir-rilpivirine during pregnancy are limited. Accordingly, cabotegravir-rilpivirine should not be selected as first-line combination antiretrovirals in treatment-naïve pregnant women or for women who are actively trying to conceive.[27] For women who become pregnant while taking long-acting injectable cabotegravir-rilpivirine, expert consultation should be obtained. Shared clinical decision-making between patient and provider is recommended regarding whether to switch to a preferred antiretroviral regimen for pregnancy versus remaining on injectable cabotegravir-rilpivirine during pregnancy.[26] If the person remains on injectable cabotegravir-rilpivirine during pregnancy, more frequent HIV RNA monitoring is recommended.[26]
- **Oral Two-Drug Regimens**: There are limited data on the use of FDA-approved 2-drug regimens (dolutegravir-lamivudine and dolutegravir-rilpivirine) in pregnancy. Therefore, these oral two-drug regimens should not be selected as first-line combination antiretrovirals in treatment-naïve pregnant

women or for those women who are actively trying to conceive.[27] If a woman becomes pregnant while taking either dolutegravir-lamivudine or dolutegravir-rilpivirine, the clinician can consider continuing the same 2-drug regimen, provided the woman has viral suppression, and if more frequent HIV RNA monitoring is conducted (typically every 1-2 months).[26] Alternatively, the pregnant woman can be switched to a preferred 3-drug oral regimen recommended for use in pregnancy.

- **Cobicistat-Boosted Regiments**: Data from the IMPAACT P1026s protocol study suggest that pregnant woman taking a regimen that includes elvitegravir-cobicistat have significantly reduced drug levels of elvitegravir and cobicistat during the third trimester of pregnancy, which would presumably lead to an increased risk of virologic failure late in the pregnancy.[28] Similar concern has been raised with regimens containing atazanavir-cobicistat or darunavir-cobicistat. As such, initiating antiretroviral therapy with a cobicistat-containing regimen is not recommended for pregnant women. If a woman becomes pregnant while taking a fully suppressive antiretroviral regimen that includes cobicistat, the regimen may be continued, provided there is frequent HIV RNA monitoring (e.g., every 1–2 months) throughout the pregnancy.[26,27] Alternatively, the medical provider may consider switching to a more effective and preferred regimen for use during pregnancy.[26,27]
- **Doravirine**: There are insufficient data on doravirine in pregnancy to recommend its use at this time. If an woman who is doing well with suppression of plasma HIV RNA levels on a doravirine-containing regimen becomes pregnant, then the decision regarding whether to switch must be made in consultation with the clinical provider, taking into account the possibility of viral rebound that may occur during a regimen change.[26,29] If the decision is made to continue the same regimen, then HIV RNA levels should be monitored more frequently, typically every 1 to 2 months.[26,29]
- **Entry Inhibitors (Fostemsavir, Ibalizumab, Maraviroc, and Enfuvirtide) and Lenacapav**ir: Although these medications are not recommended for use as initial antiretroviral therapy in pregnancy due to limited data, they are often used as part of a combination antiretroviral therapy for individuals who are highly treatment-experienced with complex HIV drug resistances. If such an individual were to become pregnant, expert consultation is recommended. Shared clinical decision-making should be used to determine whether a regimen change is indicated or not and the patient should be informed about the lack of pregnancy safety data with these medications. If the decision is made to continue the same regimen, then HIV RNA levels should be monitored more frequently, typically every 1 to 2 months.[27]

Pregnant Women with Prior Antiretroviral Treatment but Not on Therapy

Some women with HIV who become pregnant may have previously received antiretroviral therapy (or antiretrovirals as HIV PrEP), but are not currently taking any antiretroviral medications at the time when they are first evaluated during their pregnancy. In this situation, it is very important to obtain detailed information regarding past regimens, tolerance of prior medications, adherence with past regimens, evidence of prior virologic failure, and resistance testing data, if available.[30] If the pregnant woman's current HIV RNA level is above the threshold for genotypic drug-resistance testing (typically greater than 200 copies/mL), then resistance testing should be ordered prior to starting the antiretroviral regimen during the pregnancy. After the drug resistance test blood sample has been obtained, antiretroviral therapy should be started, with modification of the regimen as needed when results from the drug resistance test become available.[30] For pregnant women who previously took antiretroviral therapy and had no history of virologic failure or HIV drug resistance, then reinitiating antiretroviral therapy is relatively straightforward. For treatment-experienced persons with suspected multidrug-resistant HIV, selecting an antiretroviral regimen is complicated, depends on drug-resistance testing, and should be done by or in conjunction with an HIV treatment specialist.[30]

Antiretroviral-Naïve Pregnant Women who Present in the Third Trimester

Because INSTI-based regimens cause a very rapid decline in HIV RNA levels (estimated 2 log decline in 2 weeks), the Perinatal HIV Clinical Guidelines recommend using a dolutegravir-based antiretroviral regimen for pregnant women who are starting antiretroviral therapy late in pregnancy.[15,31,32]

Monitoring HIV RNA and CD4 Count During Pregnancy

- **HIV RNA Monitoring**: For pregnant women with HIV, the Perinatal HIV Clinical Guidelines recommend the following for monitoring HIV RNA levels during pregnancy:[33]
    - All pregnant women should have an HIV RNA level at the first antenatal visit.
    - For pregnant women initiating (or changing) an antiretroviral drug regimen, check the HIV RNA level after 2 to 4 weeks and then monthly until RNA levels are undetectable.
    - In pregnant women with undetectable HIV RNA levels, check HIV RNA levels at least every 3 months.
    - For all pregnant women, check an HIV RNA at approximately 36 weeks of gestation (or within 4 weeks of planned delivery) to inform decisions about mode of delivery.
- **CD4 Cell Count Monitoring**: For pregnant women with HIV, the Perinatal HIV Clinical Guidelines recommend the following for monitoring of CD4 cell count during pregnancy.[33]
    - All pregnant women should have a CD4 cell count checked at the first antenatal visit.
    - Women who have been on antiretroviral therapy for at least 2 years with consistently suppressed HIV RNA levels and CD4 counts consistently greater than 300 cells/mm^3 do not need CD4 count monitoring after the initial antenatal visit during pregnancy.
    - Monitoring of CD4 cell counts should be conducted every 3 to 6 months during pregnancy for women who have any of the following: (1) receipt of antiretroviral therapy for less than 2 years and a CD4 count less than 300 cells/mm^3, or (2) inconsistent adherence, or (3) detectable HIV RNA levels. For pregnant women who have been on antiretroviral therapy for less than 2 years and have a CD4 count greater than or equal to 300 cells/mm^3, the CD4 cell count should be monitored every 6 months.

Pregnant Women Who Have Not Achieved Viral Suppression

Management of pregnant women who have not achieved virologic suppression is complex and should typically involve expert consultation or management by a specialist.[34] Management should include drug resistance testing if HIV RNA levels are adequately elevated (typically greater than 200 copies/mL) to perform genotypical drug-resistance testing. Note: expert consultation can be obtained by contacting The National Clinical Consultation Center Perinatal HIV/AIDS hotline (888-448-8765).

Intrapartum Management

For pregnant women with HIV, the major management decisions at the time of labor are whether to administer intravenous zidovudine and whether to perform cesarean section. These decisions are primarily based on the pregnant woman's antiretroviral history during the pregnancy and recent HIV RNA levels. Pregnant women who have been taking combination antiretroviral therapy prior to onset of labor should continue taking their antiretroviral regimen on schedule (as good as possible) during and after labor.[35] If, however, the combination oral antiretroviral regimen includes zidovudine and the pregnant woman receives intravenous zidovudine during labor, the oral zidovudine can be held while she receives intravenous zidovudine.[35]

In Labor without Antepartum Antiretroviral Therapy

Expedited HIV-1/2 antigen-antibody immunoassay is recommended for pregnant women who present in labor and have unknown HIV antibody status and for pregnant women who have a high risk for HIV acquisition but were not tested for HIV during their third trimester of pregnancy.[35] In addition, any pregnant woman presenting in labor with symptoms of acute HIV (or with a history of a recent HIV exposure) should get an HIV RNA level in addition to an expedited HIV-1/2 antigen-antibody immunoassay.[35] Pregnant women who have a reactive test (preliminary positive) should be assumed to have HIV, and all available prevention measures (for the pregnant woman and the infant) should be initiated immediately to reduce the risk of perinatal transmission.[35] If the initial HIV-1/2 antigen-antibody immunoassay is positive, additional confirmatory testing should be performed with an HIV-1/2 differentiation assay and an HIV RNA level.[35] In this situation, the infant should immediately start on oral antiretroviral therapy, and potential continuation of antiretroviral therapy for the mother and infant will depend on the results of subsequent HIV confirmatory tests.[35]

- **Intrapartum Zidovudine**: Since a substantial proportion of perinatal HIV transmission occurs at or near the time of delivery, intrapartum intravenous zidovudine should be provided to all pregnant women with HIV who are newly diagnosed at the time of labor, pregnant women with known HIV who are not taking antiretroviral therapy late in pregnancy, and pregnant women with HIV who have an unknown HIV RNA level.[35] The administration of intravenous zidovudine should include individuals who have a positive HIV-1/2 antigen-antibody Immunoassay, but confirmatory testing (HIV RNA and/or HIV antibody differentiation) results are not yet known. The use of intrapartum and postpartum zidovudine for the newborn reduces the risk of perinatal HIV transmission from 27% to 10%.[12]
- **Cesarean Delivery**: Most experts recommend cesarean delivery for pregnant women newly diagnosed with HIV at the time of labor and for those with known HIV who are not on antiretroviral therapy, since these women are likely to have an HIV RNA level above 1,000 copies/mL—the threshold for elective cesarean section.[35] Cesarean delivery is also recommended for pregnant women with HIV who have a known HIV RNA level greater than 1,000 copies/mL obtained within 4 weeks of delivery.[35] The benefit of cesarean section after rupture of membranes or onset of labor is unknown.

Guidance for Intravenous Zidovudine Use in Labor

Intravenous zidovudine, when given early in labor, rapidly crosses the placenta and thus can efficiently provide high systemic levels of zidovudine for the infant. Available data show the use of intravenous zidovudine in labor clearly reduces perinatal HIV transmission when the pregnant woman has an HIV RNA level greater than 1,000 copies/mL near the time of delivery—defined as 34 to 36 weeks of gestation or within 4 weeks before delivery.[36] Accordingly, the Perinatal HIV Clinical Guidelines recommendation for the use of intravenous zidovudine for the pregnant woman during delivery depends on the individual's HIV RNA level near the time of delivery and whether there are any concerns for adherence with antiretroviral medication near delivery.[35]

- **HIV RNA Level >1,000 copies/mL, Unknown ,or Suspected to be >1,000 copies/mL**:

Intravenous zidovudine during delivery is recommended in all of these settings. In addition, if there is doubt about a pregnant woman's adherence with the antiretroviral therapy regimen near delivery, then intravenous zidovudine during delivery is recommended, regardless of the prior HIV RNA level.

- **HIV RNA Level between 50 and 1,000 copies/mL**: For pregnant women with HIV who have an HIV RNA level between 50 and 1,000 copies/mL within 4 weeks of delivery, inadequate data exist to guide a clear recommendation, but some experts would use intravenous zidovudine in this setting; these situations should be addressed, ideally with expert consultation, on a case-by-case basis.
- **Maternal HIV RNA Level ≤50 copies/mL**: The use of intrapartum zidovudine is not required in pregnant women who have an HIV RNA level equal to or less than 50 copies/mL within 4 weeks of delivery, if they are receiving and adhering with antiretroviral therapy.

Dosing of Zidovudine in Labor

For women who present in labor, if indicated, intravenous zidovudine should ideally be started at the onset of active labor. The recommended intravenous dose of zidovudine during labor is a 2 mg/kg loading dose over the first hour, followed by a continuous infusion of 1 mg/kg/hour for at least 2 hours (total minimum of 3 hours); the intravenous zidovudine should be continued throughout labor until delivery.[35,37] If a cesarean section is scheduled, the same dosing is recommended, but the loading dose should ideally be started 3 hours before the procedure. The intravenous zidovudine should ideally be started at the onset of active labor. For pregnant women scheduled to have a cesarean delivery, the intravenous infusion should be started at least 3 hours prior to the scheduled delivery and continued until delivery.[35]

Indications for Cesarean Section Delivery

The guidance for performing cesarean delivery for the purpose of preventing HIV transmission depends predominantly on the pregnant woman's HIV RNA level near delivery. For this reason, obtaining an HIV RNA level at approximately 36 weeks' of gestation is recommended. Note that for pregnant women, HIV coinfection with either hepatitis C virus (HCV) or hepatitis B virus (HBV) is not an independent indication for cesarean section.[38,39] The Perinatal HIV Clinical Guidelines recommend the following based on the HIV RNA level of the pregnant woman:[35]

- **HIV RNA Level >1,000 copies/mL or Unknown HIV RNA Level**: A scheduled cesarean delivery at 38 weeks of gestation should be performed for all pregnant women with HIV who have an HIV RNA level greater than 1,000 copies/mL within 4 weeks of delivery or with unknown HIV RNA levels near the time of delivery, regardless of whether they are receiving antiretroviral therapy.[35] The pregnant woman's CD4 cell count has no bearing on recommendations regarding cesarean delivery.
- **HIV RNA ≤1,000 copies/mL**: Insufficient data exist to indicate cesarean delivery would reduce the risk of HIV transmission for pregnant women receiving antiretroviral therapy who have detectable viremia that is less than or equal to 1,000 copies/mL within 4 weeks of delivery.[35] Accordingly, cesarean delivery is not recommended for the purpose of preventing HIV transmission for pregnant women who have an HIV RNA level less than 1,000 copies/mL within 4 weeks of delivery.[35]
- **HIV RNA Level >1,000 copies/mL and Rupture of Membranes**: For pregnant women who have an HIV RNA level above 1,000 copies/mL within 4 weeks of delivery, but who present with rupture of membranes (or present after the onset of labor), the benefit of cesarean delivery is unknown; a meta-analysis has found that the risk of HIV transmission increases by 2% every hour following rupture of membranes.[35] Management of these women should be individualized.
- **HIV RNA Level ≤1,000 copies/mL and Rupture of Membranes**: For pregnant women receiving antiretroviral therapy who have an HIV RNA level less than or equal to 1,000 copies/mL within 4 weeks of delivery, the duration of membrane rupture has not been shown to correlate with risk of perinatal HIV transmission and vaginal delivery is recommended in this setting.[35,40,41,42] Complex cases should be managed in consultation with an expert in HIV perinatal transmission.

Timing for Cesarean Section Delivery

Despite the potential risk of iatrogenic prematurity, the American Congress of Obstetricians and Gynecologists (ACOG) and the Perinatal HIV Clinical Guidelines recommend performing an elective cesarean delivery for pregnant women who have an HIV RNA level greater than 1,000 copies/mL (or unknown HIV RNA levels) at 38 weeks of gestation to avoid onset of labor.[35] If the pregnant woman has an HIV RNA level less than 1,000 copies/mL and the decision is made to perform cesarean delivery for obstetric reasons, the elective cesarean delivery should be performed at the standard time for the specific obstetrical indication.[35]

Obstetric Procedures and Risk of HIV Transmission

Although limited data exist regarding the impact of obstetrical procedures on HIV transmission risk, the Perinatal HIV Clinical Guidelines recommend against routine use of the following procedures: artificial rupture of membranes, invasive fetal scalp monitoring with scalp electrodes, and operative delivery with forceps or vacuum extractor (particularly for women with an HIV RNA level that is 50 copies/mL or higher or unknown HIV RNA level).[14] If, however, any of these procedures are deemed to have a clear obstetrical indication, they should be performed. The possible risk of HIV transmission from these procedures is likely lower in pregnant women who have an undetectable HIV RNA level at the time of delivery. Epidural anesthesia is considered safe during labor, regardless of the antiretroviral regimen the individual is receiving.[35] In addition, the indications for episiotomy should be the same for pregnant women with or without HIV.

Acute HIV in Pregnancy and in the Postpartum Period

Diagnosis of Acute HIV in Women who are Pregnant or Breastfeeding

Women who are pregnant or breastfeeding have an increased risk of acquiring HIV.[43,44] Acute HIV that occurs during pregnancy or while breastfeeding confers a very high risk of HIV transmission to the child because of the high HIV RNA levels in the mother's plasma, genital tract, and breastmilk that occur with acute infection. In one cohort study in New York State, investigators reported the rate of perinatal transmission was 22% among neonates born to women who acquired HIV during pregnancy compared to 1.8% of newborns born to women who did not acquire HIV during pregnancy.[45] Therefore, pregnant or breastfeeding women with symptoms of acute retroviral syndrome should undergo prompt evaluation for acute HIV infection.[21] When acute HIV is suspected during pregnancy or while breastfeeding, the evaluation should include an HIV RNA assay in combination with an HIV-1/2 antigen-antibody immunoassay.[21] If acute HIV is diagnosed during pregnancy or in a breastfeeding person, an HIV drug resistance genotype should be simultaneously ordered, along with antiretroviral therapy initiation, and contact should be initiated with a pediatric HIV expert.[46]

Antiretroviral Therapy for Acute HIV in Pregnancy

Given the high risk of HIV transmission to the fetus in the setting of acute maternal HIV infection, the Perinatal HIV Clinical Guidelines recommend that pregnant or breastfeeding women with acute HIV infection should immediately begin triple antiretroviral therapy while the HIV drug resistance genotype is pending.

- **Acute HIV in Pregnancy**: For women who are pregnant and have acute HIV and have not previously received long-acting injectable cabotegravir for HIV PrEP, the preferred antiretroviral regimen (regardless of the trimester) is dolutegravir plus either tenofovir DF-emtricitabine or tenofovir alafenamide-emtricitabine.[21] The alternative regimens are (1) bictegravir-tenofovir alafenamide-emtricitabine or (2) twice-daily ritonavir-boosted darunavir plus a dual-NRTI regimen: (tenofovir DF or tenofovir alafenamide) plus (emtricitabine or lamivudine).[21] In addition, the ritonavir-boosted darunavir regimen is indicated and preferred if the pregnant woman has been previously exposed to long-acting injectable cabotegravir for HIV PrEP. If needed, adjustments to the regimen can be made once the genotype results are known.[21]

Acute HIV in the Postpartum Period

If acute HIV is suspected in a breastfeeding mother in the postpartum period, mother should receive counseling to immediately stop breastfeeding to reduce the risk of HIV transmission to the child.[21] In this situation, expert consultation should be obtained regarding the evaluation and management of the breastfeeding infant who may have been exposed to HIV.[21] If acute HIV is diagnosed in the mother, then breastfeeding should be permanently discontinued, HIV drug resistance genotype should be ordered, and the mother newly diagnosed with HIV should be promptly started on antiretroviral therapy.[21] Note that in the postpartum period, darunavir can be boosted with either cobicistat or ritonavir, and both the boosting agent and darunavir can be given once daily.[21,47]

No Prior Cabotegravir Use

If the mother diagnosed with HIV in the postpartum period has not previously received long-acting injectable cabotegravir for HIV PrEP, the following regimens are preferred for the treatment of all persons with acute or recent HIV in whom an HIV drug resistance genotype result is pending.[47]

- Bictegravir-tenofovir alafenamide-emtricitabine
- Dolutegravir plus (tenofovir alafenamide or tenofovir DF) plus (emtricitabine or lamivudine)
- Boosted darunavir plus (tenofovir alafenamide or tenofovir DF) plus (emtricitabine or lamivudine)

Prior Cabotegravir Use

If the mother diagnosed with HIV in the postpartum period has previously received long-acting injectable cabotegravir, the following regimen is recommended while genotypic results are pending.

- Boosted darunavir plus (tenofovir alafenamide or tenofovir DF) plus (emtricitabine or lamivudine)

Management of the Infant Exposed to HIV

Type of Antiretroviral Management of Newborns With Perinatal HIV Exposure

Appropriate antiretroviral management of infants born to pregnant women with HIV plays a significant role in preventing perinatal HIV transmission. Conceptually, it is important to understand there are three different types of antiretroviral regimens used in management of newborns with perinatal HIV exposure: administration of one or more antiretroviral drugs as antiretroviral prophylaxis, three-drug combination presumptive HIV therapy, and HIV antiretroviral therapy for documented HIV infection of the newborn.[48]

Table 5. **Perinatal Guidelines: Management of Infants Born to Women with HIV Infection**

Types of Antiretroviral Management of Newborns with Perinatal HIV Exposure

Category	Definition
Antiretroviral Therapy Prophylaxis	The administration of one or more antiretroviral drugs to a newborn witho risk of perinatal acquisition of HIV.
Presumptive HIV Therapy	The administration of a three-drug combination antiretroviral regimen to r acquisition of HIV. Presumptive HIV therapy is intended to be preliminary t documented to have HIV, but also serves as prophylaxis against HIV acqu to HIV *in utero*, during the birthing process, or during breastfeeding and w
HIV Therapy	The administration of a three-drug antiretroviral regimen at treatment dos newborns with documented HIV infection.

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Management of infants born to women with HIV: antiretroviral management of newborns with perinatal HIV exposure or HIV infection. January 31, 2023. [HIV.gov]

Neonatal Antiretroviral Medications Based on Risk of HIV Acquisition

All newborns with perinatal HIV exposure should receive antiretroviral medications in the neonatal period, with the first doses initiated as soon as possible after birth, ideally within 6 to 12 hours following delivery.[48] The regimens chosen are based on the neonate's risk of HIV acquisition. The risk of perinatal HIV transmission is estimated primarily by whether the mother received antiretroviral therapy during pregnancy and their HIV RNA level within the 4 weeks prior to delivery. This information, as well as some other factors, are used to make decisions about neonatal antiretroviral intervention.[48]

Table 6. **Perinatal Guidelines: Management of Infants Born to Women with HIV Infection**

Neonatal Antiretroviral Management According to Risk of HIV Infection in the Newborn

Level of Perinatal HIV Transmission Risk		Description	Neonatal Antiretroviral Management
Low Risk of Perinatal HIV Transmission	**Infants ≥37 weeks gestation when the mother—** • Is curre	Zidovudine for 2 weeks	

Level of Perinatal HIV Transmission Risk		Description	Neonatal Antiretroviral Management
	ntly receiving and has received at least 10 consecutive weeks of ART during pregnancy, and • Has achieved and maintained or maintained viral suppression (defined as at least two consecutive tests with HIV RNA levels <50 copies/mL obtained at least 4 weeks apart) for the remainder of the pregnancy, and • Has HIV RNA <50 co		

Level of Perinatal HIV Transmission Risk		Description	Neonatal Antiretroviral Management
	pies/mL at or after 36 weeks and within 4 weeks of delivery, and • Did not have acute HIV infection during pregnancy, and • Has reported good ART adherence, and adherence concerns have not been identified.		
	Infants born to mothers who do not meet the criteria above or criteria for high risk below but who have an HIV RNA <50 copies/mL at or after 36 weeks gestation	Zidovudine for 4-6 weeks	
	Premature infants (<37 weeks	Zidovudine for 4-6 weeks	

Level of Perinatal HIV Transmission Risk		Description	Neonatal Antiretroviral Management
	gestation) who are not at high risk of perinatal acquisition of HIV		
High Risk of Perinatal HIV Transmission[a,b]	Mothers who did not receive antepartum antiretroviral drugs, *or* Mothers who received only intrapartum antiretroviral drugs, *or* Mothers who received antepartum antiretroviral drugs but did not have viral suppression (defined as at least two consecutive tests with HIV RNA level <50 copies/mL obtained at least 4 weeks apart) within 4 weeks prior to delivery, *or* Mothers with acute or primary HIV infection during pregnancy or breastfeeding (in which case, **breastfeeding should be immediately**	Presumptive HIV therapy using either: Zidovudine, lamivudine, and nevirapine (treatment dose) from birth for 2-6 weeks (if the duration of the 3-drug regimen is shorter than 6 weeks, zidovudine should be continued alone, to complete a total of 6 weeks of prophylaxis)[d] *or* Zidovudine, lamivudine, and raltegravir administered from birth for 2-6 weeks (if the duration of the 3-drug regimen is shorter than 6 weeks, zidovudine should be continued alone, to complete a total of 6 weeks of prophylaxis)[d]	

Level of Perinatal HIV Transmission Risk	Description	Neonatal Antiretroviral Management
	)[c]	
Presumed Newborn HIV Exposure	Mothers with unconfirmed HIV status who have at least one positive HIV test at delivery or postpartum *or* Mothers whose newborns have a positive HIV antibody test	Antiretroviral management as described above for newborns with a high risk of perinatal HIV acquisition Infant antiretroviral drugs should be discontinued immediately if supplemental testing confirms that the mother does not have HIV.
Newborn with Confirmed HIV[e]	Positive newborn HIV virologic test/nucleic acid test (NAT)	Start recommended 3-drug antiretroviral regimen using treatment doses (refer to Pediatric Antiretroviral Guidelines)

[a] Zidovudine prophylaxis is recommended for infants born to mothers with HIV-2 monoinfection. If the mother has HIV-1 and HIV-2 infection, the infant antiretroviral regimen should be based on the determination of low or high risk of HIV-1 transmission as described in the above table. Because HIV-2 is not susceptible to nevirapine, raltegravir should be considered for infants at high risk of perinatal HIV-2 acquisition.
[b] See the Intrapartum Care section for guidance on indications for scheduled cesarean delivery and intrapartum intravenous zidovudine to reduce the risk of perinatal HIV transmission for mothers with elevated viral load at delivery.
[c] Most Panel members would opt to administer empiric HIV therapy to infants whose mothers

Level of Perinatal HIV Transmission Risk	Description		Neonatal Antiretroviral Management
had acute HIV during pregnancy because of the high risk for *in utero* transmission. If acute HIV is diagnosed during breastfeeding, the mother should immediately discontinue breastfeeding. [d] The optimal duration of presumptive HIV therapy in newborns who are at a high risk for perinatal HIV acquisition is unknown. Newborns who are at high risk of HIV acquisition should receive the zidovudine component of the three-drug presumptive HIV therapy regimen for 6 weeks. The other two antiretrovirals (lamivudine and nevirapine or lamivudine plus raltegravir) may be administered for 2 to 6 weeks; the recommended duration for treatment with three antiretroviral varies depending on infant HIV NAT results, maternal viral load at the time of delivery, and additional risk factors for HIV transmission including breastfeeding. Consultation with an expert in pediatric HIV is recommended when selecting a therapy duration because this decision should be based on case-specific risk factors and interim infant HIV NAT results. [e] Infant antiretroviral therapy should be initiated without waiting for the results of confirmatory HIV NAT testing, given the low likelihood of a false-positive HIV NAT. However, the specimen for confirmatory HIV testing should be obtained prior to antiretroviral initiation. Note: Antiretroviral drugs should be initiated as close to the time of birth as possible, preferably within 6 hours of delivery. Key to Acronyms: NAT = nucleic acid test			

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Management of infants born to women with HIV: antiretroviral management of newborns with perinatal HIV exposure or HIV infection. January 31, 2023. [HIV.gov]

Dosing of Antiretroviral Medications in Neonates

As outlined in the following table, the dosing for all antiretroviral medications in newborns should be based on

Table 7. **Perinatal Guidelines: Management of Infants Born to Women with HIV Infection**

Antiretroviral Dosing Recommendations for Newborns

Drug	Drug Doses by Gestation Age at Birth
Zidovudine Note: For newborns unable to tolerate oral agents, the IV dose is 75% of the oral dose while maintaining the same dosing interval.	**≥35 Weeks Gestation at Birth** *Birth to Age 4 Weeks:* • Zidovudine 4 mg/kg/dose orally twice daily or alternative simplified weight-band dosing (see below) *Age >4 weeks:* • Zidovudine 12 mg/kg per dose orally twice daily; only make this dose increase for infants with confirmed HIV infection **Simplified Weight-Band Dosing for Newborns Aged ≥35 Weeks Gestation from Birth to 4 Weeks** Weight Band — Volume of Zidovudine 10 mg/mL Oral Syrup Twice Daily 2 to <3 kg — 1 mL 3 to <4 kg — 1.5 mL 4 to <5 kg — 2 mL
	≥30 to <35 Weeks Gestation at Birth *Birth to Age 2 Weeks:* • Zidovudine 2 mg/kg per dose orally twice daily *Age 2 Weeks to 6 to 8 Weeks:* • Zidovudine 3 mg/kg per dose orally twice daily *Age >6 to 8 Weeks:* • Zidovudine 12 mg/kg per dose orally twice daily; make this dose increase only for infants with confirmed HIV infection
	<30 Weeks Gestation at Birth *Birth to Age 4 Weeks:*

Drug	Drug Doses by Gestation Age at Birth
	• Zidovudine 2 mg/kg per dose orally twice daily *Age 4 to 8 to 10 Weeks:* • Zidovudine 3 mg/kg per dose orally twice daily *Age >8 to 10 Weeks:* • Zidovudine 12 mg/kg per dose orally twice daily; only make this dose increase for infants with confirmed HIV
Abacavir Provided HLA-B5701 allele testing is negative Note: abacavir is not approved by the FDA for use in neonates and infants aged <1 month. However, dosing recommendations have been modeled using PK simulation. Because of abacavir-associated hypersensitivity, negative testing for HLA-B5701 allele should be confirmed prior to administration of abacavir.	**≥37 Weeks' Gestation at Birth** *Birth to 1 Month:* • Abacavir 2 mg/kg per dose orally twice daily *Age 1 Month to <3 Months:* • Abacavir 4 mg/kg per dose orally twice daily
Lamivudine	**≥32 Weeks' Gestation at Birth** *Birth to Age 4 Weeks:* • Lamivudine 2 mg/kg/dose orally twice daily *Age >4 Weeks:* • Lamivudine 4 mg/kg per dose orally twice daily
Nevirapine	**≥37 Weeks Gestation at Birth:** *Birth to Age 4 Weeks:* • Nevirapine 6 mg/kg per dose orally twice daily *Age >4 Weeks:* • Nevirapine 200 mg/m^2 of body surface area (BSA) per dose

Drug	Drug Doses by Gestation Age at Birth
	orally twice daily; only make this dose increase for infants with confirmed HIV infection. **Note**: Nevirapine dose adjustment at 4 weeks of age is optional for empiric HIV therapy
	≥34 to <37 Weeks Gestation at Birth *Birth to Age 1 Week:* • Nevirapine 4 mg/kg per dose orally twice daily *Age 1 to 4 Weeks:* • Nevirapine 6 mg/kg per dose orally twice daily *Age >4 Weeks:* • Nevirapine 200 mg/m^2 of BSA per dose orally twice daily; only make this dose increase for infants with confirmed HIV infection.
	≥32 to <34 Weeks' Gestation at Birth *Birth to Age 2 Weeks* • Nevirapine 2 mg/kg per dose orally twice daily *Age 2 to 4 Weeks* • Nevirapine 4 mg/kg per dose orally twice daily *Age 4 to 6 Weeks* • Nevirapine 6 mg/kg per dose orally twice daily *Age >6 Weeks* • Nevirapine 200 mg/m^2 BSA per dose orally twice daily; only make this dose increase for infants with confirmed HIV infection.

Drug	Drug Doses by Gestation Age at Birth	
Raltegravir **Note**: If the mother has taken raltegravir 2 to 24 hours prior to delivery, the neonate's first dose of raltegravir should be delayed until 24 to 48 hours after birth; additional antiretroviral drugs should be started as soon as possible.	≥37 Weeks Gestation at Birth and Weighing ≥2 kg *Birth to Age 6 Weeks:*	
	Body Weight	Volume (Dose) of Raltegravir 10 mg/mL Suspension
	Birth to 1 Week: Once Daily Dosing	**Approximately 1.5 mg/kg per dose**
	2 to <3 kg	0.4 mL (4 mg) once daily
	3 to <4 kg	0.5 mL (5 mg) once daily
	4 to <5 kg	0.7 mL (7 mg) once daily
	1 to 4 Weeks: Twice Daily Dosing	**Approximately 3 mg/kg per dose**
	2 to <3 kg	0.8 mL (8 mg) twice daily
	3 to <4 kg	1 mL (10 mg) twice daily
	4 to <5 kg	1.5 mL (15 mg) twice daily
	4 to 6 Weeks: Twice Daily Dosing	**Approximately 6 mg/kg per dose**
	3 to <4 kg	2.5 mL (25 mg) twice daily
	4 to <6 kg	3 mL (30 mg) twice daily
	6 to <8 kg	4 mL (40 mg) twice daily

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Management of infants born to women with HIV: antiretroviral management of newborns with perinatal HIV exposure or HIV infection. January 31, 2023. [HIV.gov]

Additional Initial Care of the Neonate Exposed to HIV

In addition to providing antiretroviral management for all neonates born to women with HIV, other aspects of care need to be addressed. Following delivery, infants born to persons with HIV require hematological monitoring in addition to routine infant care; there is no evidence that changes in routine bathing practices or timing of circumcision are required.[49] A complete blood count (CBC) and differential should be performed at birth prior to the initiation of infant antiretroviral drug prophylaxis and again at 4 weeks of age, since anemia

is the primary complication of zidovudine.[49] In addition, some experts advise checking serum chemistry and liver function tests depending on which antiretroviral therapies the infant was exposed to *in utero*.

Evaluating the Infant for HIV

Initial HIV testing in infants should be performed using an HIV nucleic acid test (NAT)—with either an HIV DNA or HIV RNA assay.[50] Routine HIV antigen-antibody testing should not be used to diagnose HIV in newborns since HIV antibody crosses the placenta typically persist for at least 6 months and can persist through 18 months of age, and HIV p24 antigen is much less sensitive than HIV NAT.[50] For the criteria listed below for presumptive and definitive exclusion of infant HIV infection, the child should not have any laboratory or clinical indicator that may suggest HIV infection (e.g., a low CD4 cell count or any clinical findings).

- **Recommended Testing**: The recommendations schedule for HIV NAT in infants with perinatal HIV exposure depends on whether the risk of HIV acquisition is considered low or high. Infants with a low risk of perinatal HIV exposure should have HIV NAT performed at 14 to 21 days of life, 1 to 2 months of age, and 4 to 6 months of age; infants considered to have high-risk for perinatal acquisition of HIV should have additional HIV NATs performed at birth, 14 to 21 days of life, 1 to 2 months of age, 2 to 3 months of age, and 4 to 6 months of age (Figure 6).[50]
- **Recommended Testing for Breastfed Infants**: Infants with perinatal exposure who are being breastfed should have HIV NAT obtained at birth and after birth at ages 14-21 days, 1 to 2 months, 2 to 4 months, and at 4 to 6 months.[50] If breastfeeding continues after the infant is 6 months of age, NAT testing should be continued and performed every 3 months.[50] Further, HIV NAT should be obtained at 6 weeks, 3 months, and 6 months after cessation of breastfeeding, regardless of the age at when breastfeeding stopped.[50]
- **Testing for Non-B Virus Subtypes**: Due to the increasing proportion of foreign-born children with HIV in the United States, testing for non-B viral subtypes is now recommended and HIV NAT should be performed in a laboratory that will detect non-B HIV subtypes if the birthing parent is known to have or suspected to have non-B subtype HIV.[49,50]
- **Antibody Testing After 12 Months of Age**: A negative HIV antibody test at 12 to 18 months of age provides further confirmation of the child's HIV-negative status, and some experts perform antibody testing at this age in infants with prior negative HIV NAT.[49,50]
- **Presumptive Exclusion of HIV**: In non-breastfed infants, HIV can be presumptively excluded when any of the following criteria are met: (1) two or more negative HIV NAATs (one at age ≥2 weeks and one test at ≥4 weeks), (2) one negative virologic test at age ≥8 weeks at least 2 weeks after discontinuation of multidrug antiretroviral prophylaxis, or (3) one negative HIV antibody test at age ≥6 months.[50]
- **Definitive Exclusion of HIV**: Definitive exclusion of HIV in non-breastfed infants can be based on either (1) two or more negative virologic tests (one test at age ≥1 month and at least 2–6 weeks after discontinuing multidrug antiretroviral prophylaxis and another test at age ≥4 months), or (2) two negative HIV antibody tests obtained from separate specimens at age ≥6 months.[50]
- **Indeterminate HIV Status**: This refers to an HIV-exposed child aged younger than 18 months of age who was born to a person with HIV, and the child does not meet the criteria for having HIV or for not having contracted HIV.[50]

Pneumocystis Pneumonia Prophylaxis for the Infant

At 4 to 6 weeks of age, all infants born to individuals with HIV should begin prophylaxis for *Pneumocystis* pneumonia unless HIV has been presumptively excluded with virologic testing.[49] The preferred agent for *Pneumocystis* pneumonia prophylaxis in neonates is trimethoprim-sulfamethoxazole.[51] The prophylaxis for *Pneumocystis* pneumonia can be discontinued if the HIV diagnosis in the child is presumptively or definitively excluded.

Long-term Follow-up of Infants Born to Persons with HIV

Although the long-term effects of *in utero* exposure to antiretroviral therapy and to HIV itself (even if the infant was not infected) are not fully known, available data suggest that antiretroviral therapy taken during pregnancy does not cause subsequent long-term risk of neoplasia or organ toxicities to these children.[52,53,54,55,56] Nevertheless, further study is needed since newer antiretroviral agents continue to be used in pregnant women with HIV. Multiple studies and surveillance projects at the state and national level are ongoing. The Perinatal HIV Clinical Guidelines recommend that any children with *in utero*/perinatal exposure to antiretroviral therapy who develop organ system abnormalities, particularly neurological or cardiac, should be evaluated for mitochondrial dysfunction, and follow-up of children exposed to antiretroviral medications should continue lifelong due to concern for potential carcinogenicity of nucleoside reverse transcriptase inhibitor drugs.[55] In the long-term medical record of the child, the medical provider should document specific information related to the child's exposure to antiretroviral medications *in utero* and in the postpartum period.

Postpartum Follow-Up for Women with HIV

Infant Feeding recommendations in the United States

All pregnant women should receive counseling on breastfeeding.[57] The options and recommendations in the Perinatal HIV Clinical Guidelines for breastfeeding and infant feeding, as outlined below, should be informed by whether the woman with HIV giving birth to the infant is taking antiretroviral therapy and whether this person with HIV has suppressed plasma HIV RNA levels.[48,57]

- **Mother Does Not Have Virologic Suppression**: In general, for women with HIV who give birth and who are not on antiretrovirals (or are taking antiretrovirals without virologic suppression during pregnancy), breastfeeding is not recommended. These women should be given information on formula or banked pasteurized donor human milk in order to mitigate the risk of HIV transmission to the infant from breast milk.
- **Birth Parent with Suppressed HIV RNA Levels**: For women with HIV who give birth and are taking antiretroviral therapy and have undetectable plasma HIV RNA levels, studies in resource-limited environments have shown the risk of HIV transmission via breastfeeding in the setting of virologic suppression is quite low (less than 1%), albeit not zero.[57,58,59] For women with sustained viral suppression on antiretroviral therapy, the Perinatal HIV Clinical Guidelines recommend the mother and medical provider engage in informed, shared decision-making regarding the risk-benefit ratio of breastfeeding. Regardless of whether the patient chooses to breastfeed or formula feed, their health care provider should support the decision. For those women with sustained viral suppression who choose to breastfeed, some experts would recommend one of the following three options for the newborn: (1) extending the duration of zidovudine prophylaxis from 2 weeks to 4–6 weeks, (2) use nevirapine prophylaxis for 6 weeks, or (3) extend the duration of nevirapine throughout breastfeeding.[48]

Postpartum Antiretroviral Therapy

Pregnant women with HIV who receive antiretroviral therapy during pregnancy should continue to receive antiretroviral therapy after delivery, both for their own health and to prevent sexual transmission of HIV to their sex partners.[60] The HPTN 052 study, among others, has shown that antiretroviral therapy markedly reduces the risk of sexual HIV transmission to uninfected partners in HIV-serodifferent couples.[61] Taking antiretroviral therapy in the postpartum period may be very challenging due to the mother’s fatigue, psychosocial stress, and demands and responsibilities of taking care of a newborn. Indeed, multiple studies have shown that antiretroviral adherence and rates of viral suppression decline after women with HIV give birth.[62,63,64] All women with HIV who give birth should undergo screening for postpartum depression, since depression in the postpartum period is common and may negatively impact antiretroviral adherence.[63] Medical providers should make sure that the woman recently giving birth and their infant receive any prescribed antiretroviral medications prior to hospital discharge.[60]

Summary Points

- All pregnant women should undergo screening for HIV, including women who present in labor without prior testing during the pregnancy.
- For pregnant women with HIV, perinatal HIV transmission rates of less than 1% can be achieved with a comprehensive, multipronged approach that includes suppressive combination antiretroviral therapy during pregnancy, use of elective cesarean section (when indicated), intravenous zidovudine during labor (when indicated), and postnatal infant antiretroviral prophylaxis. The risk of perinatal HIV transmission correlates with HIV RNA levels in the pregnant woman, but there is no HIV RNA level cutoff at which transmission cannot occur.
- All women diagnosed with HIV during pregnancy (and women with known HIV who become pregnant but are not receiving antiretroviral therapy) should promptly start combination antiretroviral therapy and continue antiretroviral therapy throughout the pregnancy.
- The preferred initial antiretroviral regimens consist of dual NRTIs (abacavir-lamivudine; tenofovir alafenamide plus either emtricitabine or lamivudine; or tenofovir DF plus either emtricitabine or lamivudine) in combination with an anchor drug—either dolutegravir or ritonavir-boosted darunavir.
- In most circumstances, women with established HIV who become pregnant and are already taking fully suppressive antiretroviral therapy should continue the same regimen. Consideration should be given to switching from any 2-drug regimen or any regimen that contains cobicistat.
- Laboratory monitoring of HIV RNA levels should occur every 3 months during pregnancy to evaluate for viral suppression; more frequent HIV RNA monitoring (every 1 to 2 months) may be needed depending on the antiretroviral regimen taken during pregnancy. Obtaining an HIV RNA level at 36 weeks of gestation, or within 4 weeks of planned delivery, is important in making decisions about delivery and newborn management.
- Pregnant women who present late to prenatal care should start on antiretroviral therapy immediately, and additional interventions, including intravenous zidovudine and elective cesarean section, may be recommended to help decrease the risk of perinatal transmission.
- For pregnant women with HIV, cesarean section and intravenous zidovudine during labor are indicated if the HIV RNA level is greater than 1,000 copies/mL within the 4 weeks prior to delivery (or if they have an unknown HIV RNA level within the 4 weeks prior to delivery).
- Evaluation for HIV infection of infants younger than 18 months of age who are born to women with HIV requires use of HIV nucleic acid amplification tests; a positive HIV antibody test is not reliable since HIV antibodies cross the placenta and often persist in the infant for at least 18 months. Infants born to women with HIV should receive antiretroviral management based on the infant's risk of having acquired HIV.
- Women with untreated HIV who give birth are advised to avoid breastfeeding due to the risk of transmitting HIV to their infant through colostrum and breastmilk and the availability of affordable, safe, and acceptable feeding alternatives. Postpartum women who have undetectable HIV RNA levels on stable antiretroviral therapy should have a discussion with their healthcare provider regarding the risks and benefits of breastfeeding.

Citations

1. McGowan JP, Shah SS. Prevention of perinatal HIV transmission during pregnancy. J Antimicrob Chemother. 2000;46:657-68.
[PubMed Abstract] -

2. Whitmore SK, Taylor AW, Espinoza L, Shouse RL, Lampe MA, Nesheim S. Correlates of mother-to-child transmission of HIV in the United States and Puerto Rico. Pediatrics. 2012;129:e74-81.
[PubMed Abstract] -

3. Centers for Disease Control and Prevention (CDC). Achievements in public health. Reduction in perinatal transmission of HIV infection--United States, 1985-2005. MMWR Morb Mortal Wkly Rep. 2006;55:592-7.
[PubMed Abstract] -

4. Centers for Disease Control and Prevention. Diagnoses of HIV infection in the United States and dependent areas, 2020. HIV Surveillance Report, 2022; vol. 33:1-143. Published May 2022.
[CDC] -

5. Nesheim SR, FitzHarris LF, Lampe MA, Gray KM. Reconsidering the Number of Women With HIV Infection Who Give Birth Annually in the United States. Public Health Rep. 2018;133:637-643.
[PubMed Abstract] -

6. Connor EM, Sperling RS, Gelber R, et al. Reduction of maternal-infant transmission of human immunodeficiency virus type 1 with zidovudine treatment. Pediatric AIDS Clinical Trials Group Protocol 076 Study Group. N Engl J Med. 1994;331:1173-80.
[PubMed Abstract] -

7. Kourtis AP, Bulterys M, Nesheim SR, Lee FK. Understanding the timing of HIV transmission from mother to infant. JAMA. 2001;285:709-12.
[PubMed Abstract] -

8. Nesheim S, Taylor A, Lampe MA, et al. A framework for elimination of perinatal transmission of HIV in the United States. Pediatrics. 2012;130:738-44.
[PubMed Abstract] -

9. Townsend CL, Cortina-Borja M, Peckham CS, de Ruiter A, Lyall H, Tookey PA. Low rates of mother-to-child transmission of HIV following effective pregnancy interventions in the United Kingdom and Ireland, 2000-2006. AIDS. 2008;22:973-81.
[PubMed Abstract] -

10. Warszawski J, Tubiana R, Le Chenadec J, et al. Mother-to-child HIV transmission despite antiretroviral therapy in the ANRS French Perinatal Cohort. AIDS. 2008;22:289-99.
[PubMed Abstract] -

11. Cooper ER, Charurat M, Mofenson L, et al. Combination antiretroviral strategies for the treatment of pregnant HIV-1-infected women and prevention of perinatal HIV-1 transmission. J Acquir Immune Defic Syndr. 2002;29:484-94.
[PubMed Abstract] -

12. Wade NA, Birkhead GS, Warren BL, et al. Abbreviated regimens of zidovudine prophylaxis and perinatal transmission of the human immunodeficiency virus. N Engl J Med. 1998;339:1409-14.
[PubMed Abstract] -

13. Siegfried N, van der Merwe L, Brocklehurst P, Sint TT. Antiretrovirals for reducing the risk of mother-to-child transmission of HIV infection. Cochrane Database Syst Rev. 2011;:CD003510.
[PubMed Abstract] -

14. Mandelbrot L, Mayaux MJ, Bongain A, et al. Obstetric factors and mother-to-child transmission of human immunodeficiency virus type 1: the French perinatal cohorts. SEROGEST French Pediatric HIV Infection Study Group. Am J Obstet Gynecol. 1996;175(3 Pt 1):661-7.
[PubMed Abstract] -

15. Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Recommendations for use of antiretroviral drugs during pregnancy: pregnant women with HIV who have never received antiretroviral drugs (antiretroviral naive). January 31, 2024.
[HIV.gov] -

16. Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. January 31, 2024.
[HIV.gov] -

17. Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Maternal HIV testing and identification of perinatal HIV exposure January 31, 2024.
[HIV.gov] -

18. Branson BM, Handsfield HH, Lampe MA, et al. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. MMWR Recomm Rep. 2006;55:1-17.
[PubMed Abstract] -

19. Chou R, Cantor AG, Zakher B, Bougatsos C. Screening for HIV in pregnant women: systematic review to update the 2005 U.S. Preventive Services Task Force recommendation. Ann Intern Med. 2012;157:719-28.
[PubMed Abstract] -

20. Moyer VA; U.S. Preventive Services Task Force. Screening for HIV: U.S. Preventive Services Task Force Recommendation Statement. Ann Intern Med. 2013;159:51-60.
[PubMed Abstract] -

21. Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Special populations: early (acute and recent) HIV infection. January 31, 2024.
[HIV.gov] -

22. Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum care for individuals with HIV. January 31, 2024.
[HIV.gov] -

23. Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission.

Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Recommendations for the use of antiretroviral drugs during pregnancy: antiretroviral drug regimens and maternal and neonatal outcomes. January 31, 2024.
[HIV.gov] -

24. Ioannidis JP, Abrams EJ, Ammann A, et al. Perinatal transmission of human immunodeficiency virus type 1 by pregnant women with RNA virus loads Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum Care. Recommendations for use of antiretroviral drugs during pregnancy. Table 6. What to start: initial antiretroviral regimens during pregnancy for women who are antiretroviral-naive. January 31, 2024.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum Care. Recommendations for use of antiretroviral drugs during pregnancy: women with HIV who are taking antiretroviral therapy when they become pregnant. January 31, 2024.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum Care. Recommendations for use of antiretroviral drugs during pregnancy. Table 7. Situation-specific recommendations for use of antiretroviral drugs in pregnant women and nonpregnant women who are trying to conceive. January 31, 2024.Best B, Caparelli E, Stek A, et al. Elvitegravir/Cobicistat Pharmacokinetics in Pregnancy and Postpartum. Conference on Retroviruses and Opportunistic Infections 2017; Seattle, WA. Abstract 755.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Appendix C: Antiretroviral counseling guide for health care providers. January 31, 2024.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Recommendations for use of antiretroviral drugs during pregnancy: pregnant women with HIV who have previously received antiretroviral medications but are not currently on antiretroviral medications. Janaruy 31, 2024.Rahangdale L, Cates J, Potter J, et al. Integrase inhibitors in late pregnancy and rapid HIV viral load reduction. Am J Obstet Gynecol. 2016;214:385.e1-7.Westling K, Pettersson K, Kaldma A, Navér L. Rapid decline in HIV viral load when introducing raltegravir-containing antiretroviral treatment late in pregnancy. AIDS Patient Care STDS. 2012;26:714-7.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum care: initial evaluation and continued monitoring of HIV-related assessments during pregnancy. January 31, 2024.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Recommendations for us of antiretroviral therapy during pregnancy: pregnant women who have not achieved virologic suppression on antiretroviral therapy. January 31, 2024.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Intrapartum care for women with HIV. January 31, 2023.Briand N, Warszawski J, Mandelbrot L, et al. Is intrapartum intravenous zidovudine for prevention of mother-to-child HIV-1 transmission still useful in the combination antiretroviral therapy era? Clin Infect Dis. 2013;57:903-14.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum Care. Appendix B: Supplement: safety and toxicity of individual antiretroviral agents in pregnancy. Table 14. Antiretroviral drug use in pregnant women with HIV: pharmacokinetic and toxicity data in human pregnancy and recommendations for use in pregnancy. January 31, 2024.Panel on Treatment of HIV

During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Special populations: Hepatitis B virus/HIV coinfection. January 31, 2024.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Special populations: Hepatitis C virus/HIV coinfection. January 31, 2024.Cotter AM, Brookfield KF, Duthely LM, Gonzalez Quintero VH, Potter JE, O'Sullivan MJ. Duration of membrane rupture and risk of perinatal transmission of HIV-1 in the era of combination antiretroviral therapy. Am J Obstet Gynecol. 2012;207:482.e1-5.Eppes C. Is it time to leave the avoidance of rupture of membranes for women infected with HIV and receiving cART in the past? BJOG. 2016 May;123:982.Peters H, Byrne L, De Ruiter A, et al. Duration of ruptured membranes and mother-to-child HIV transmission: a prospective population-based surveillance study. BJOG. 2016;123:975-81.Drake AL, Wagner A, Richardson B, John-Stewart G. Incident HIV during pregnancy and postpartum and risk of mother-to-child HIV transmission: a systematic review and meta-analysis. PLoS Med. 2014;11:e1001608.Thomson KA, Hughes J, Baeten JM, et al. Increased Risk of HIV Acquisition Among Women Throughout Pregnancy and During the Postpartum Period: A Prospective Per-Coital-Act Analysis Among Women With HIV-Infected Partners. J Infect Dis. 2018;218:16-25.Birkhead GS, Pulver WP, Warren BL, Hackel S, Rodríguez D, Smith L. Acquiring human immunodeficiency virus during pregnancy and mother-to-child transmission in New York: 2002-2006. Obstet Gynecol. 2010;115:1247-55.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum care: antiretroviral drug resistance and resistance testing in pregnancy. January 31, 2024.Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the use of antiretroviral agents in adults and adolescents with HIV. Department of Health and Human Services. Considerations for antiretroviral use in special patient populations: early (acute and recent) HIV infection. September 12, 2024.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Management of infants born to women with HIV: antiretroviral management of newborns with perinatal HIV exposure or HIV infection. January 31, 2023.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Management of infants born to women with HIV: initial postnatal management of the neonate exposed to HIV. January 31, 2024.Panel on Antiretroviral Therapy and Medical Management of Children Living with HIV. Guidelines for the use of antiretroviral agents in pediatric HIV infection. Diagnosis of HIV infection in infants and children. December 19, 2024.Panel on Opportunistic Infections in Children with and Exposed to HIV. Guidelines for the prevention and treatment of opportunistic infections in children with and exposed to HIV. Watts DH, Huang S, Culnane M, et al. Birth defects among a cohort of infants born to HIV-infected women on antiretroviral medication. J Perinat Med. 2011;39:163-70.Knapp KM, Brogly SB, Muenz DG, et al. Prevalence of congenital anomalies in infants with in utero exposure to antiretrovirals. Pediatr Infect Dis J. 2012;31:164-70.Floridia M, Mastroiacovo P, Tamburrini E, et al. Birth defects in a national cohort of pregnant women with HIV infection in Italy, 2001-2011. BJOG. 2013;120:1466-75.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Management of infants born to women with HIV infection: long-term follow-up of infants exposed to antiretroviral drugs. January 31, 2024.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Recommendations for use of antiretroviral drugs during pregnancy: teratogenicity. January 31, 2024.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Infant Feeding for Individuals with HIV in the United States. January 31, 2023.Flynn PM, Taha TE, Cababasay M, et al. Prevention of

HIV-1 Transmission Through Breastfeeding: Efficacy and Safety of Maternal Antiretroviral Therapy Versus Infant Nevirapine Prophylaxis for Duration of Breastfeeding in HIV-1-Infected Women With High CD4 Cell Count (IMPAACT PROMISE): A Randomized, Open-Label, Clinical Trial. J Acquir Immune Defic Syndr. 2018;77:383-92.Behrens GMN, Aebi-Popp K, Babiker A. Close to Zero, but Not Zero: What Is an Acceptable HIV Transmission Risk Through Breastfeeding? J Acquir Immune Defic Syndr. 2022;89:e42.Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Postpartum follow-up of women with HIV. January 31, 2024.Cohen MS, Chen YQ, McCauley M, et al. Prevention of HIV-1 infection with early antiretroviral therapy. N Engl J Med. 2011;365:493-505.Adams JW, Brady KA, Michael YL, Yehia BR, Momplaisir FM. Postpartum Engagement in HIV Care: An Important Predictor of Long-term Retention in Care and Viral Suppression. Clin Infect Dis. 2015;61:1880-7.Rubin LH, Cook JA, Grey DD, et al. Perinatal depressive symptoms in HIV-infected versus HIV-uninfected women: a prospective study from preconception to postpartum. J Womens Health (Larchmt). 2011;20:1287-95.Mellins CA, Chu C, Malee K, et al. Adherence to antiretroviral treatment among pregnant and postpartum HIV-infected women. AIDS Care. 2008;20:958-68.

References

- Blonk MI, Colbers AP, Hidalgo-Tenorio C, et al. Raltegravir in HIV-1-Infected Pregnant Women: Pharmacokinetics, Safety, and Efficacy. Clin Infect Dis. 2015;61:809-16.
  [PubMed Abstract] -

- Cecchini DM, Martinez MG, Morganti LM, Rodriguez CG. Antiretroviral Therapy Containing Raltegravir to Prevent Mother-to-Child Transmission of HIV in Infected Pregnant Women. Infect Dis Rep. 2017;9:7017.
  [PubMed Abstract] -

- Duryea E, Nicholson F, Cooper S, et al. The Use of Protease Inhibitors in Pregnancy: Maternal and Fetal Considerations. Infect Dis Obstet Gynecol. 2015;2015:563727.
  [PubMed Abstract] -

- Fogel J, Li Q, Taha TE, et al. Initiation of antiretroviral treatment in women after delivery can induce multiclass drug resistance in breastfeeding HIV-infected infants. Clin Infect Dis. 2011;52:1069-76.
  [PubMed Abstract] -

- Ford N, Calmy A, Mofenson L. Safety of efavirenz in the first trimester of pregnancy: an updated systematic review and meta-analysis. AIDS. 2011; 25: 2301-4.
  [PubMed Abstract] -

- Khan S, Tsang KK, Brophy J, et al. Canadian Pediatric & Perinatal HIV/AIDS Research Group consensus recommendations for infant feeding in the HIV context. J Assoc Med Microbiol Infect Dis Can. 2023;8:7-17.
  [PubMed Abstract] -

- Kreitchmann R, Best BM, Wang J, et al. Pharmacokinetics of an increased atazanavir dose with and without tenofovir during the third trimester of pregnancy. J Acquir Immune Defic Syndr. 2013;63:59-66.
  [PubMed Abstract] -

- Lampe MA, Nesheim SR, Oladapo KL, Ewing AC, Wiener J, Kourtis AP. Achieving Elimination of Perinatal HIV in the United States. Pediatrics. 2023;151:e2022059604.
  [PubMed Abstract] -

- Le Doaré K, Bland R, Newell ML. Neurodevelopment in children born to HIV-infected mothers by infection and treatment status. Pediatrics. 2012;130:e1326-44.
  [PubMed Abstract] -

- Lockman S, Brummel SS, Ziemba L, et al. Efficacy and safety of dolutegravir with emtricitabine and tenofovir alafenamide fumarate or tenofovir disoproxil fumarate, and efavirenz, emtricitabine, and tenofovir disoproxil fumarate HIV antiretroviral therapy regimens started in pregnancy (IMPAACT 2010/VESTED): a multicentre, open-label, randomised, controlled, phase 3 trial. Lancet. 2021;397:1276-92.
  [PubMed Abstract] -

- Malaba TR, Nakatudde I, Kintu K, et al. 72 weeks post-partum follow-up of dolutegravir versus efavirenz initiated in late pregnancy (DolPHIN-2): an open-label, randomised controlled study. Lancet HIV. 2022;9:e534-e543.
  [PubMed Abstract] -

- Mofenson LM, Baggaley RC, Mameletzis I. Tenofovir disoproxil fumarate safety for women and their infants during pregnancy and breastfeeding. AIDS. 2017;31:213-232.
  [PubMed Abstract] -

- Nesheim SR, Wiener J, Fitz Harris LF, Lampe MA, Weidle PJ. Brief Report: Estimated Incidence of Perinatally Acquired HIV Infection in the United States, 1978-2013. J Acquir Immune Defic Syndr. 2017;76:461-4.
  [PubMed Abstract] -

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Recommendations for use of antiretroviral drugs during pregnancy. Antiretroviral therapy for women who are trying to conceive. January 31, 2024.
  [HIV.gov] -

- Pinnetti C, Baroncelli S, Villani P, et al. Rapid HIV-RNA decline following addition of raltegravir and tenofovir to ongoing highly active antiretroviral therapy in a woman presenting with high-level HIV viraemia at week 38 of pregnancy. J Antimicrob Chemother. 2010;65:2050-2.
  [PubMed Abstract] -

- Siberry GK, Jacobson DL, Kalkwarf HJ, et al. Lower Newborn Bone Mineral Content Associated With Maternal Use of Tenofovir Disoproxil Fumarate During Pregnancy. Clin Infect Dis. 2015;61:996-1003.
  [PubMed Abstract] -

- Stek A, Best BM, Wang J, et al. Pharmacokinetics of Once Versus Twice Daily Darunavir in Pregnant HIV-Infected Women. J Acquir Immune Defic Syndr. 2015;70:33-41.
  [PubMed Abstract] -

- The European Mode of Delivery Collaboration. Elective caesarean-section versus vaginal delivery in prevention of vertical HIV-1 transmission: a randomised clinical trial. Lancet. 1999;353:1035-9.
  [PubMed Abstract] -

- The mode of delivery and the risk of vertical transmission of human immunodeficiency virus type 1--a meta-analysis of 15 prospective cohort studies. The International Perinatal HIV Group. N Engl J Med. 1999;340:977-87.
  [PubMed Abstract] -

- Tubiana R, Le Chenadec J, Rouzioux C, et al. Factors associated with mother-to-child transmission of

HIV-1 despite a maternal viral load Tuomala RE, Shapiro DE, Mofenson LM, et al. Antiretroviral therapy during pregnancy and the risk of an adverse outcome. N Engl J Med. 2002;346:1863-70.Van de Perre P, Simonon A, Msellati P, et al. Postnatal transmission of human immunodeficiency virus type 1 from mother to infant. A prospective cohort study in Kigali, Rwanda. N Engl J Med. 1991;325:593-8.Wertz J, Cesario J, Sackrison J, Kim S, Dola C. Acute HIV Infection in Pregnancy: the case for third trimester rescreening. Case Rep Infect Dis. 2011;2011:340817.Zash R, Holmes L, Diseko M, et al. Neural-Tube Defects and Antiretroviral Treatment Regimens in Botswana. N Engl J Med. 2019;381:827-40.Zash R, Holmes LB, Diseko M, et al. Update on neural tube defects with antiretroviral exposure in the Tsepamo study, Botswana. Abstract PEBLB14. Presented at: IAS; 2021. Virtual ConferenceZash R, Makhema J, Shapiro RL. Neural-Tube Defects with Dolutegravir Treatment from the Time of Conception. N Engl J Med. 2018;379:979-81.

Figures

Figure 1 Perinatal HIV Infections in the United States, 2016-2020

Source: Centers for Disease Control and Prevention. Diagnoses of HIV infection in the United States and dependent areas, 2018 (Preliminary). HIV Surveillance Report, 2020; vol. 33:1-143. Published May 2022.

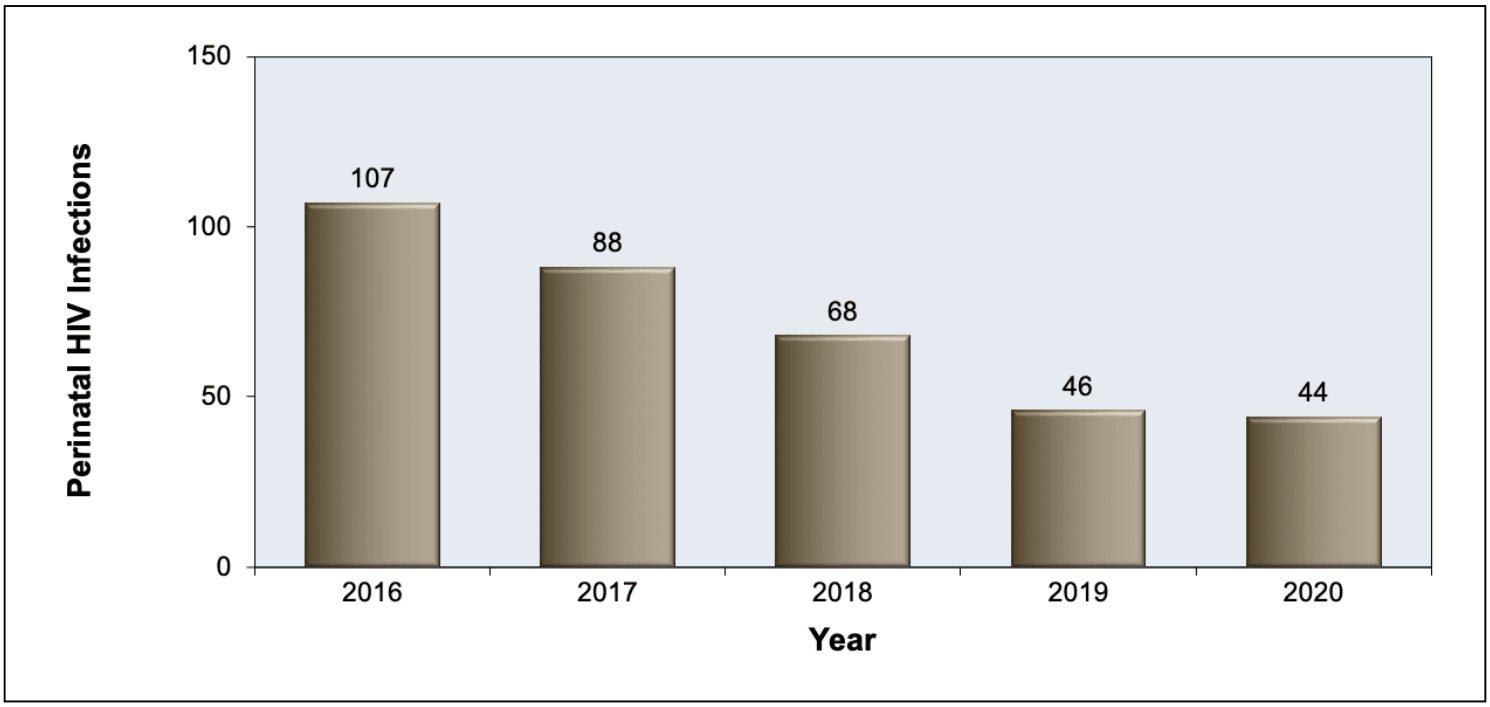


Figure 2 Pediatric AIDS Clinical Trials Group Protocol 076

Source: Connor EM, Sperling RS, Gelber R, et al. Reduction of maternal-infant transmission of human immunodeficiency virus type 1 with zidovudine treatment. Pediatric AIDS Clinical Trials Group Protocol 076 Study Group. N Engl J Med. 1994;331:1173-80.

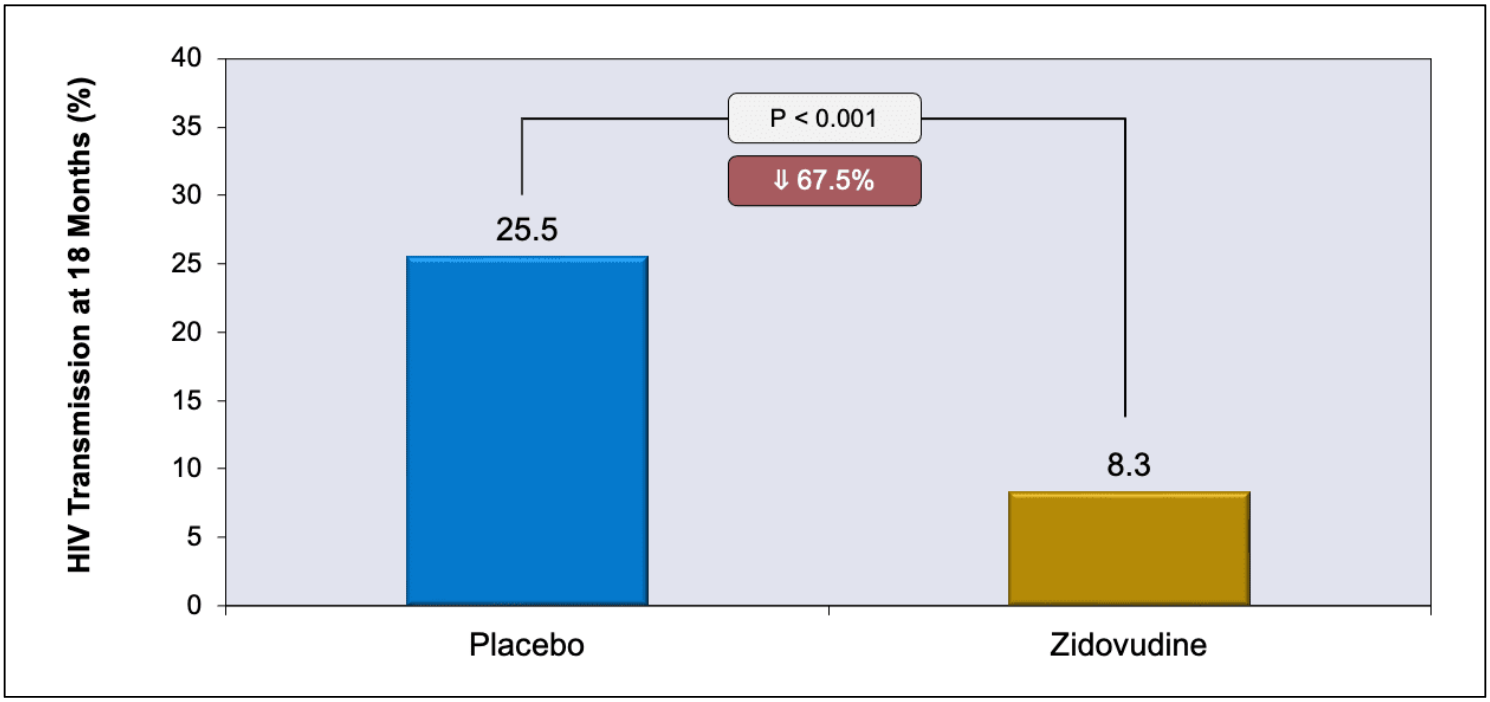


Figure 3 Timing of Abbreviated Regimens of Zidovudine and Risk of Perinatal HIV Transmission

Source: Wade NA, Birkhead GS, Warren BL, et al. Abbreviated regimens of zidovudine prophylaxis and perinatal transmission of the human immunodeficiency virus. N Engl J Med. 1998;339:1409-14.

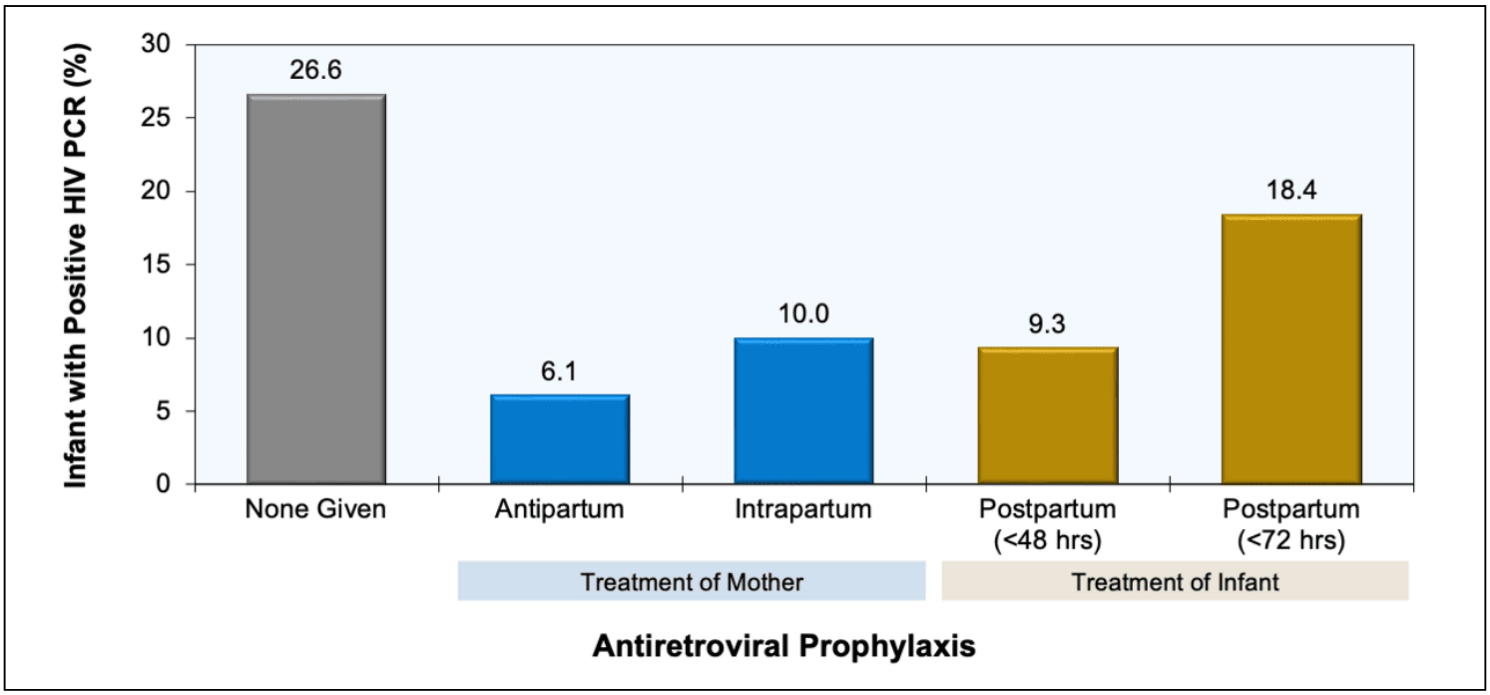


Figure 4 Antenatal Antiretroviral Therapy and Impact on Perinatal HIV Transmission

Source: Cooper ER, Charurat M, Mofenson L, et al. Combination antiretroviral strategies for the treatment of pregnant HIV-1-infected women and prevention of perinatal HIV-1 transmission. J Acquir Immune Defic Syndr. 2002;29:484-94.

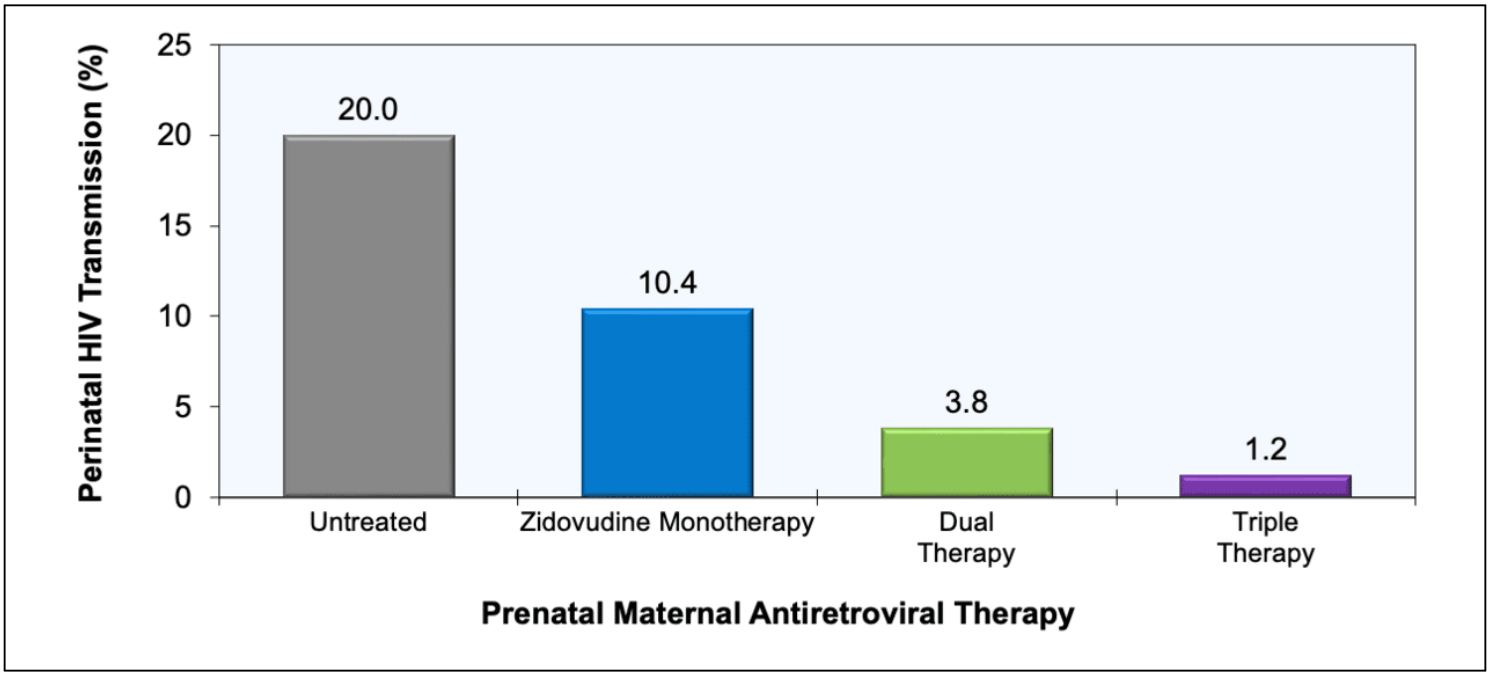


Figure 5 Perinatal HIV-1 Transmission Rates According to HIV RNA Level at Delivery: The ANRS French Perinatal Cohort (1997–2004)

In the ANRS French Perinatal Cohort study, investigators evaluated the risk of mother-to-child HIV transmission in 5,271 mothers who received antiretroviral therapy during pregnancy. This graph shows the HIV transmission rate based on the HIV RNA level of the mother at delivery and the time of gestation when the baby was born.

Source: Warszawski J, Tubiana R, Le Chenadec J, et al. Mother-to-child HIV transmission despite antiretroviral therapy in the ANRS French Perinatal Cohort. AIDS. 2008;22:289-99.

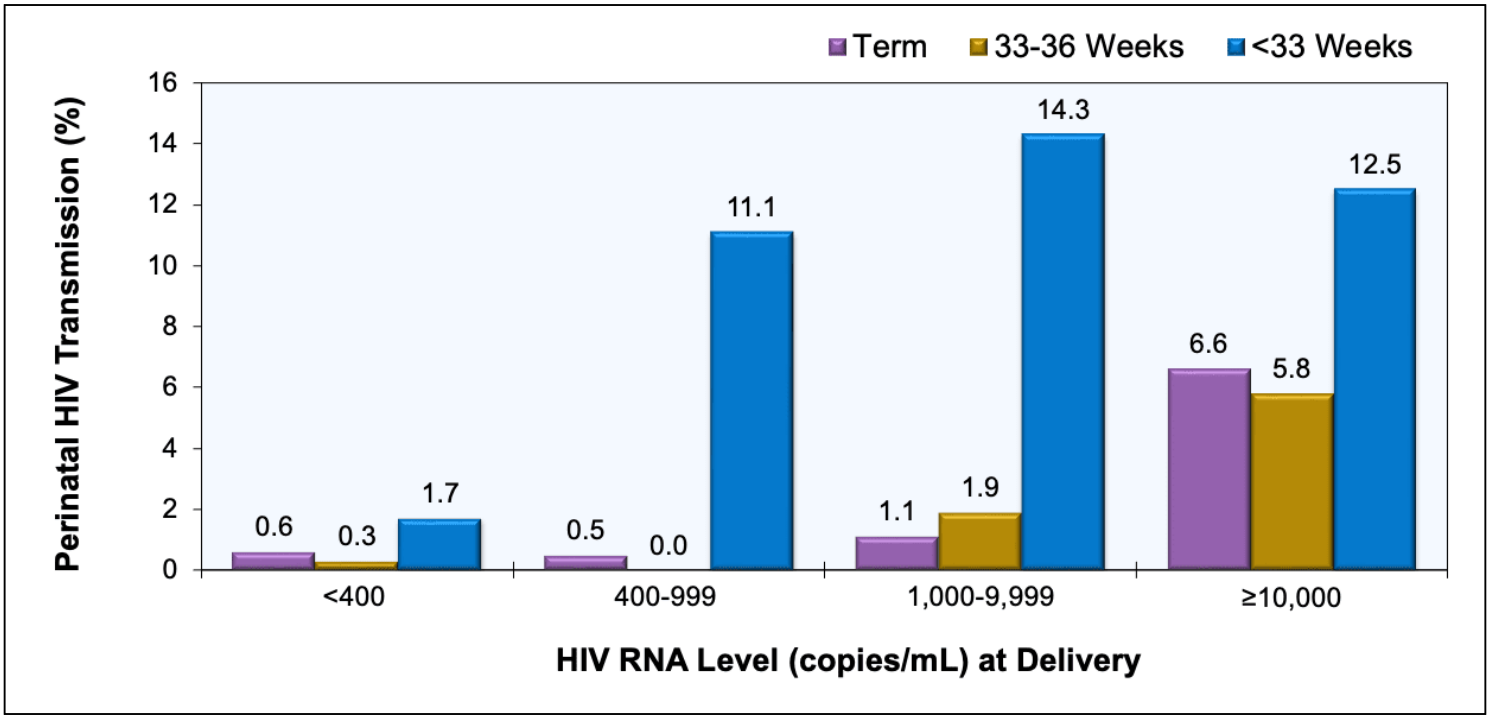
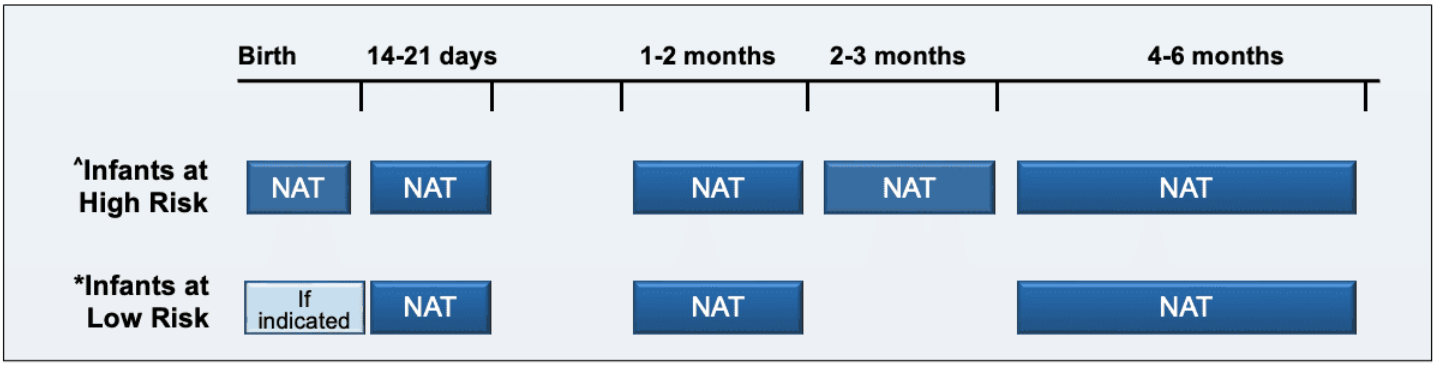


Figure 6 Recommended Virologic Testing Schedules for Infants Exposed to HIV by Perinatal HIV Transmission Risk

Abbreviations: NAT = nucleic acid test
For low-risk infants the last test may be timed to occur at least 2 weeks after stopping antiretroviral therapy
*For high-risk infants, additional virologic diagnostic testing is recommended at birth and 2 to 6 weeks after cessation of antiretroviral prophylaxis (i.e., at 8 to 12 weeks of life).
"Low Risk" refers to infants born to persons with HIV who received standard antiretroviral therapy during pregnancy and achieved sustained suppression of HIV RNA levels and no concerns exist regarding antiretroviral adherence during the pregnancy.
"Higher Risk" infants are those born to persons with HIV who did not receive prenatal care, did not receive antepartum or intrapartum antiretroviral therapy, received only intrapartum antiretroviral medications, initiated antiretroviral therapy late in pregnancy (late second or third trimester), were diagnosed with acute HIV infection during pregnancy, or had detectable HIV viral loads close to the time of delivery.

Source: Panel on Antiretroviral Therapy and Medical Management of Children Living with HIV. Guidelines for the use of antiretroviral agents in pediatric HIV infection. Diagnosis of HIV infection in infants and children. December 19, 2024.



^Infants at high risk refers to infants with mother who had any of the following: viremia (HIV RNA ≥50 copies/mL) in the 4 weeks prior to delivery, acute/early HIV infection during the pregnancy, or a new diagnosis with HIV during labor.
*Infants at low risk refers to infants who are not being breastfed and their mother had sustained virologic suppression (HIV RNA levels <50 copies/mL) from 20 weeks of gestation through delivery.

Table 1. **Perinatal Guidelines: Recommendations for Use of Antiretroviral Drugs During Pregnancy**

***Preferred* Initial Regimens in Pregnancy**

Drugs or drug combinations are designated as *Preferred* for therapy during pregnancy when clinical trial data in adults have demonstrated efficacy and durability with acceptable toxicity and ease of use, and pregnancy-specific pharmacokinetic data are available to guide dosing. In addition, the available data must suggest a favorable risk-benefit balance for the drug or drug combination compared to other antiretroviral drug options; the assessment of risks and benefits should incorporate outcomes for maternal, pregnancy, fetal, and infant outcomes. Some *Preferred* drugs or regimens may have minimal toxicity or teratogenicity risks that are offset by other advantages for women with HIV who are pregnant or who are trying to conceive. Therefore, it is important to read all the information on each drug in the *Perinatal Guidelines* before administering any of these medications to patients.

***Preferred* Dual-NRTI Backbones**	**Advantages**	**Disadvantages**
Abacavir-lamivudine	• Once-daily dosing • Available as a fixed-dose combination • Well-tolerated during pregnancy • Reassuring PK data during pregnancy	• Requires HLA Abacavir **sho** who test posi of the risk of hypersensitiv education ab reactions. • Abacavir is n • Abacavir-lam atazanavir b efavirenz is n pretreatment copies/mL. • Abacavir is n regimens for HIV infection previously te B*5701 gene or tenofovir a abacavir will antiretroviral B*5701 test r
Tenofovir alafenamide-emtricitabine *or* Tenofovir alafenamide plus lamivudine	• Once-daily dosing • Available as a fixed-dose combination • Reassuring PK data and extensive use during pregnancy; no dose adjustment required in pregnancy • Both NRTI combinations active against HBV • Minimal toxicity compared with zidovudine-lamivudine • When combined with dolutegravir, the efficacy and toxicity of tenofovir alafenamide-emtricitabine and	• When combin tenofovir alaf associated wi emergent ob women comp emtricitabine weight gain i beneficial, as column.)

	tenofovir DF-emtricitabine for treatment of pregnant women are similar, but tenofovir alafenamide-emtricitabine is associated with fewer adverse birth outcomes and less risk of insufficient weight gain in pregnancy.	
	• Once-daily dosing • Available as a fixed-dose combination • Reassuring PK data and extensive use during pregnancy; no dose adjustment required in pregnancy • Both NRTI combinations active against HBV • When combined with dolutegravir, the efficacy and toxicity of tenofovir alafenamide-emtricitabine and tenofovir DF-emtricitabine for treatment of pregnant women are similar.	
Tenofovir DF-emtricitabine *or* Tenofovir DF plus lamivudine		• Potential con early-life grov tenofovir DF, are reassurin • Tenofovir DF thus, tenofov combinations in patients wi
***Preferred* INSTI Regimens**	**Advantages**	**Disadvantages**
Dolutegravir-abacavir-lamivudine *or* Dolutegravir plus a *Preferred* Dual-NRTI Backbone	• Once-daily dosing • Dolutegravir-abacavir-lamivudine is available as a fixed-dose combination. • Sufficient data about PK, efficacy, and safety of dolutegravir in pregnancy • High rates of viral suppression • Dose adjustments during pregnancy are not needed. • May be particularly useful when drug interactions or the potential for preterm delivery with a PI-based regimen are a concern. • Dolutegravir has been shown to rapidly decrease viral load in ARV-naive pregnant women who present to care later in pregnancy. In nonpregnant adults, dolutegravir is associated with lower rates of INSTI resistance than raltegravir, and dolutegravir allows for once-daily dosing; for these reasons, dolutegravir is particularly useful for pregnant women presenting late in pregnancy. • Dolutegravir with a NRTI backbone of (tenofovir alafenamide or tenofovir DF) with (lamivudine or emtricitabine) is the *Preferred* regimen for initial treatment in women with early (acute or recent) HIV infection in women without a history of cabotegravir exposure for PrEP.	• Potential con gain with dolu • Dolutegravir- requires HLA- (see abacavir • Specific timin recommenda taken with ca prenatal vitar • Dolutegravir treatment in recent) HIV in cabotegravir concerns abo mutations; da ritonavir is *Pr*
***Preferred* PI Regimens (only with prior exposure to long-acting injectable cabotegravir)**	**Advantages**	**Disadvantages**
Darunavir boosted with ritonavir	• Darunavir boosted with ritonavir is a Preferred PI only	• Not available

plus a *Preferred* Dual-NRTI Backbone	in persons with previous exposure to long-acting injectable cabotegravir. In all other circumstances, darunavir boosted with ritonavir is an alternative)	• Requires twic pregnancy • Requires adm • PIs may incre
Abbreviations: NRTI = nucleoside reverse transcriptase inhibitor; INSTI = integrase strand transfer inhibitor; PI = p antiretroviral; PK = pharmacokinetics; PrEP = preexposure prophylaxis		

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum Care. Recommendations for use of antiretroviral drugs during pregnancy. Table 6. What to start: initial antiretroviral regimens during pregnancy for women who are antiretroviral-naive. January 31, 2024. [HIV.gov]

Table 2. **Perinatal Guidelines: Recommendations for Use of Antiretroviral Drugs During Pregnancy**

***Alternative* Initial Regimens in Pregnancy**

Drugs or drug combinations are designated as *Alternative* options for therapy during pregnancy when clinical trial data in adults show efficacy and the data in pregnant women are generally favorable, but limited. Most *Alternative* drugs or regimens are associated with more PK, dosing, tolerability, formulation, administration, or interaction concerns than those in the *Preferred* category, but they are acceptable for use in pregnancy. Some *Alternative* drugs or regimens may have known toxicity or teratogenicity risks that are offset by other advantages for women with HIV who are pregnant or who are trying to conceive. Therefore, it is important to read all the information on each drug in the *Perinatal Guidelines* before administering any of these medications to patients.

***Alternative* INSTI Regimens**	**Advantages**	**Disadvantages**
Bictegravir-tenofovir alafenamide-emtricitabine	• Coformulated as a single, once daily pill • High barrier to resistance • No food requirement • No dose adjustment required in pregnancy • No safety concerns observed • High rates of viral suppression	• PK and safety dat small studies. Dru woman who is in than in nonpregn are reduced in lat for bictegravir tha levels remained a are anticipated to • May be associate • Specific timing an apply if bictegrav (e.g., in prenatal
Raltegravir plus a *Preferred* Dual-NRTI Backbone	• Reassuring safety data • No safety concerns observed. Raltegravir may be particularly useful when drug interactions or the potential for preterm delivery with PI-based regimens are a concern. • PK data are available for raltegravir in pregnancy when using the twice-daily formulation (400 mg twice daily). • Like dolutegravir, raltegravir has been shown to rapidly decrease viral load in ARV-naive pregnant women who present to care later in pregnancy. In nonpregnant adults, dolutegravir is associated with lower rates of INSTI resistance than raltegravir, and dolutegravir permits once-daily dosing; for these reasons, dolutegravir is *Preferred* and raltegravir is *Alternative* for use during pregnancy.	• Twice-daily dosin due to low drug le during pregnancy • Not available as a • Lower barrier to r this reason, ralteg pregnancy • PK data are not a mg (2 x 600 mg) (raltegravir HD) in • Specific timing an apply if raltegravi (e.g., in prenatal
***Alternative* PI Regimens**	**Advantages**	**Disadvantages**
Atazanavir boosted with ritonavir plus a *Preferred* Dual-NRTI Backbone	• Once-daily dosing • Extensive experience during pregnancy	• Not available as a • Associated with in bilirubin levels, w the risk of neonat clinically significa kernicterus report monitoring is reco • Requires increase

		trimester • Has been associa reductions in lang and late language • PIs may increase • Cannot be used w • Requires consider H2 blockers, whic pregnancy.
Darunavir boosted with ritonavir plus a *Preferred* Dual-NRTI Backbone	• When a protease inhibitor-based regimen is indicated, darunavir boosted with ritonavir is recommended over atazanavir. However, darunavir boosted with ritonavir requires twice-daily dosing in pregnancy, and dosing frequency affects adherence. For that reason, when use of a PI-based regimen is indicated during pregnancy, some Panel members would use atazanavir boosted with ritonavir rather than darunavir boosted with ritonavir for ART. • Darunavir boosted with ritonavir with a NRTI backbone of tenofovir alafenamide or tenofovir DF with lamivudine or emtricitabine is the *Preferred* regimen for initial treatment in women with a history of CAB-LA exposure for HIV PrEP.	• Not available as a • Requires twice-da • Requires adminis • PIs may increase
***Alternative* NRTI Regimens**	**Advantages**	**Disadvantages**
Zidovudine-lamivudine	• Available as a fixed-dose combination • Significant experience during pregnancy	• Requires twice-da • Associated with h including nausea, maternal and neo • Other regimens h greater efficacy a
***Alternative* NNRTI Regimens**	**Advantages**	**Disadvantages**
Efavirenz-tenofovir DF-emtricitabine *or* Efavirenz-tenofovir DF-lamivudine *or* Efavirenz plus a *Preferred* Dual-NRTI Backbone	• Once-daily dosing • Available as a fixed-dose combination • Extensive experience in pregnancy • Not associated with increased risk of neural tube defect or other congenital anomalies in human studies (although cautionary text based on animal studies remains in the package insert. • No dose changes are required during pregnancy. • Useful for patients who require treatment with drugs that have significant interactions with *Preferred* agents or who need the convenience of a coformulated, single-tablet, once-daily regimen and are not eligible for dolutegravir.	• Overall higher rat some *Preferred* d • Requires enhance suicidality • Increased risk of observed with efa versus dolutegrav emtricitabine star • Increased risk of fatigue, hepatoto
Rilpivirine-tenofovir DF-emtricitabine or	• Once-daily dosing • Available as a fixed-dose combination • Useful for patients who require treatment with drugs that have significant interactions with *Preferred* agents or who need the convenience	• Limited use for in HIV RNA. Rilpivirin patients with pret copies/mL or CD4 • Requires close vir

Rilpivirine-tenofovir alafenamide-emtricitabine Rilpivirine (oral) plus a *Preferred* Dual-NRTI Backbone	of a coformulated, single-tablet, once-daily regimen and are not eligible for dolutegravir	trimesters becaus levels. Insufficien • Do not use with p • Requires consider H2 blockers or pr commonly used d • Requires administ
Abbreviations: NRTI = nucleoside reverse transcriptase inhibitor; INSTI = integrase strand transfer inhibitor; PI = p antiretroviral; PK = pharmacokinetics; PrEP = preexposure prophylaxis		

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum Care. Recommendations for use of antiretroviral drugs during pregnancy. Table 6. What to start: initial antiretroviral regimens during pregnancy for women who are antiretroviral-naive. January 31, 2024. [HIV.gov]

Table 3. **Perinatal Guidelines: Recommendations for Use of Antiretroviral Drugs During Pregnancy**

***Insufficient Data* for Use as Initial Regimens in Pregnancy**

These drugs and drug combinations are approved for use in adults, but pregnancy-specific PK or safety data are too limited to make recommendations for use in pregnant women. When a pregnant woman presents to care while virally suppressed on one of these drugs or drug combinations, providers should consider whether to continue their current regimen or switch to a recommended antiretroviral regimen.

Insufficient Data	**Advantages**	**Disadvantages**
Doravirine *or* Doravirine-tenofovir DF-lamivudine	• Coformulated with tenofovir DF-lamivudine as single table • No food requirement	• Limited PK, toxici • Initial studies sug in third trimester.

Abbreviations: PK = pharmacokinetic

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum Care. Recommendations for use of antiretroviral drugs during pregnancy. Table 6. What to start: initial antiretroviral regimens during pregnancy for women who are antiretroviral-naive. January 31, 2024. [HIV.gov]

Table 4. **Perinatal Guidelines: Recommendations for Use of Antiretroviral Drugs During Pregnancy**

***Not Recommended* for Use as Initial Regimens in Pregnancy**

Drugs and drug combinations listed in this category are *Not Recommended* for use in pregnancy because of inferior virologic efficacy or potentially serious safety concerns for the pregnant woman or fetus or because they are not recommended for initial therapy in non-pregnant adults. This category includes drugs or drug combinations for which PK data demonstrate low drug levels and risk of viral rebound during pregnancy. Levels of these drugs are often low in late pregnancy (during the second and third trimesters), when risk for perinatal transmission is high if viremia in the pregnant woman occurs.

Not Recommended	**Advantages**	**Disadvantages**
Atazanavir-cobicistat		• Limited existing d both cobicistat ar trimesters. • Changing cobicist to improve efficac
Long-Acting Injectable cabotegravir plus rilpivirine (Co-packaged Formulation)	• Injectable delivery may be more effective and/or more convenient than oral antiretroviral therapy for some patients. • Approved for nonpregnant adults who have RNA levels <50 copies/mL for at least 3 months on a stable oral ARV regimen, with no history of treatment failure and no known or suspected resistance	• Limited PK, toxici pregnancy • Not recommende antiretroviral-naiv or nonpregnant) • Due to the long h and rilpivirine, dru months after the switch to an oral
Darunavir-cobicistat *or* Darunavir-cobicistat-tenofovir alafenamide-emtricitabine	• Darunavir-cobicistat-tenofovir alafenamide-emtricitabinee is coformulated as single-tablet, once-daily regimen	• Limited existing d both cobicistat ar trimesters; viral b reported. • Changing cobicist to improve efficac addition to adding darunavir and rito
Elvitegravir-cobicistat-tenofovir alafenamide-emtricitabine *or* Elvitegravir-cobicistat-tenofovir DF-emtricitabine	• Coformulated as single-tablet, once-daily regimen	• Limited existing d both cobicistat ar trimesters. • Viral breakthroug 26% of individual insufficient to sug • Unlike for daruna cobicistat, there i with ritonavir boo • Specific timing ar apply, especially in prenatal vitami

Abbreviations: ARV = antiretroviral; PK = pharmacokinetic

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Antepartum Care. Recommendations for use of

antiretroviral drugs during pregnancy. Table 6. What to start: initial antiretroviral regimens during pregnancy for women who are antiretroviral-naive. January 31, 2024. [HIV.gov]

Table 5. **Perinatal Guidelines: Management of Infants Born to Women with HIV Infection**

Types of Antiretroviral Management of Newborns with Perinatal HIV Exposure

Category	Definition
Antiretroviral Therapy Prophylaxis	The administration of one or more antiretroviral drugs to a newborn witho risk of perinatal acquisition of HIV.
Presumptive HIV Therapy	The administration of a three-drug combination antiretroviral regimen to r acquisition of HIV. Presumptive HIV therapy is intended to be preliminary t documented to have HIV, but also serves as prophylaxis against HIV acqu to HIV *in utero*, during the birthing process, or during breastfeeding and w
HIV Therapy	The administration of a three-drug antiretroviral regimen at treatment dos newborns with documented HIV infection.

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Management of infants born to women with HIV: antiretroviral management of newborns with perinatal HIV exposure or HIV infection. January 31, 2023. [HIV.gov]

Table 6. **Perinatal Guidelines: Management of Infants Born to Women with HIV Infection**

Neonatal Antiretroviral Management According to Risk of HIV Infection in the Newborn

Level of Perinatal HIV Transmission Risk	Description	Neonatal Antiretroviral Management
Low Risk of Perinatal HIV Transmission	**Infants ≥37 weeks gestation when the mother—** • Is currently receiving and has received at least 10 consecutive weeks of ART during pregnancy, and • Has achieved and maintained or maintained viral suppression (defined as at least two consecutive tests with HIV RNA levels <50 copies/mL obtained at least 4 weeks apart) for the remainder of the pregnancy, and • Has HIV RNA <50 copies/mL at or after 36 weeks and within 4 weeks of delivery, and • Did not have acute HIV infection during pregnancy, and • Has reported good ART adherence, and adherence concerns have not been identified.	Zidovudine for 2 weeks
	Infants born to mothers who do not meet the criteria above or criteria for high risk below but who have an HIV RNA <50 copies/mL at or after 36 weeks gestation	Zidovudine for 4-6 weeks
	Premature infants (<37 weeks gestation) who are not at high risk of perinatal acquisition of HIV	Zidovudine for 4-6 weeks
High Risk of Perinatal HIV Transmission[a,b]	Mothers who did not receive antepartum antiretroviral drugs, *or* Mothers who received only intrapartum antiretroviral drugs, *or* Mothers who received antepartum antiretroviral drugs but did not have viral suppression (defined as at least two consecutive tests with	Presumptive HIV therapy using either: Zidovudine, lamivudine, and nevirapine (treatment dose) from birth for 2-6 weeks (if the duration of the 3-drug regimen is shorter than 6 weeks, zidovudine should be continued alone, to complete a total of 6 weeks of prophylaxis)[d] *or*

Level of Perinatal HIV Transmission Risk	Description	Neonatal Antiretroviral Management
	HIV RNA level <50 copies/mL obtained at least 4 weeks apart) within 4 weeks prior to delivery, *or* Mothers with acute or primary HIV infection during pregnancy or breastfeeding (in which case, **breastfeeding should be immediately discontinued**)[c]	Zidovudine, lamivudine, and raltegravir administered from birth for 2-6 weeks (if the duration of the 3-drug regimen is shorter than 6 weeks, zidovudine should be continued alone, to complete a total of 6 weeks of prophylaxis)[d]
Presumed Newborn HIV Exposure	Mothers with unconfirmed HIV status who have at least one positive HIV test at delivery or postpartum *or* Mothers whose newborns have a positive HIV antibody test	Antiretroviral management as described above for newborns with a high risk of perinatal HIV acquisition Infant antiretroviral drugs should be discontinued immediately if supplemental testing confirms that the mother does not have HIV.
Newborn with Confirmed HIV[e]	Positive newborn HIV virologic test/nucleic acid test (NAT)	Start recommended 3-drug antiretroviral regimen using treatment doses (refer to Pediatric Antiretroviral Guidelines)

[a] Zidovudine prophylaxis is recommended for infants born to mothers with HIV-2 monoinfection. If the mother has HIV-1 and HIV-2 infection, the infant antiretroviral regimen should be based on the determination of low or high risk of HIV-1 transmission as described in the above table. Because HIV-2 is not susceptible to nevirapine, raltegravir should be considered for infants at high risk of perinatal HIV-2 acquisition.
[b] See the Intrapartum Care section for guidance on indications for scheduled cesarean delivery and intrapartum intravenous zidovudine to reduce the risk of perinatal HIV transmission for mothers with elevated viral load at delivery.
[c] Most Panel members would opt to administer empiric HIV therapy to infants whose mothers had acute HIV during pregnancy because of the high risk for *in utero* transmission. If acute HIV is diagnosed during breastfeeding, the mother should immediately discontinue breastfeeding.
[d] The optimal duration of presumptive HIV therapy in newborns who are at a high risk for perinatal HIV acquisition is unknown. Newborns who are at high risk of HIV acquisition should receive the zidovudine component of the three-drug presumptive HIV therapy regimen for 6 weeks. The other two antiretrovirals (lamivudine and nevirapine or lamivudine plus raltegravir) may be administered for 2 to 6 weeks; the recommended duration for treatment with three antiretroviral varies depending on infant HIV NAT results, maternal viral load at the time of delivery, and additional risk factors for HIV transmission including breastfeeding. Consultation with an expert in pediatric HIV is recommended when selecting a therapy duration because this decision should be based on case-specific risk factors and interim infant HIV NAT results.
[e] Infant antiretroviral therapy should be initiated without waiting for the results of confirmatory HIV NAT testing, given the low likelihood of a false-positive HIV NAT. However, the specimen for confirmatory HIV testing should be obtained prior to antiretroviral initiation.

Note: Antiretroviral drugs should be initiated as close to the time of birth as possible, preferably within 6 hours of delivery.

Key to Acronyms: NAT = nucleic acid test

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Management of infants born to women with HIV: antiretroviral management of newborns with perinatal HIV exposure or HIV infection. January 31, 2023. [HIV.gov]

Table 7. **Perinatal Guidelines: Management of Infants Born to Women with HIV Infection**

Antiretroviral Dosing Recommendations for Newborns

Drug	Drug Doses by Gestation Age at Birth
Zidovudine Note: For newborns unable to tolerate oral agents, the IV dose is 75% of the oral dose while maintaining the same dosing interval.	**≥35 Weeks Gestation at Birth** *Birth to Age 4 Weeks:* • Zidovudine 4 mg/kg/dose orally twice daily or alternative simplified weight-band dosing (see below) *Age >4 weeks:* • Zidovudine 12 mg/kg per dose orally twice daily; only make this dose increase for infants with confirmed HIV infection **Simplified Weight-Band Dosing for Newborns Aged ≥35 Weeks Gestation from Birth to 4 Weeks** Weight Band — Volume of Zidovudine 10 mg/mL Oral Syrup Twice Daily 2 to <3 kg — 1 mL 3 to <4 kg — 1.5 mL 4 to <5 kg — 2 mL
	≥30 to <35 Weeks Gestation at Birth *Birth to Age 2 Weeks:* • Zidovudine 2 mg/kg per dose orally twice daily *Age 2 Weeks to 6 to 8 Weeks:* • Zidovudine 3 mg/kg per dose orally twice daily *Age >6 to 8 Weeks:* • Zidovudine 12 mg/kg per dose orally twice daily; make this dose increase only for infants with confirmed HIV infection
	<30 Weeks Gestation at Birth *Birth to Age 4 Weeks:* • Zidovudine 2 mg/kg per dose orally twice daily *Age 4 to 8 to 10 Weeks:* • Zidovudine 3 mg/kg per dose orally twice daily *Age >8 to 10 Weeks:*

Drug	Drug Doses by Gestation Age at Birth
	• Zidovudine 12 mg/kg per dose orally twice daily; only make this dose increase for infants with confirmed HIV
Abacavir Provided HLA-B5701 allele testing is negative Note: abacavir is not approved by the FDA for use in neonates and infants aged <1 month. However, dosing recommendations have been modeled using PK simulation. Because of abacavir-associated hypersensitivity, negative testing for HLA-B5701 allele should be confirmed prior to administration of abacavir.	**≥37 Weeks' Gestation at Birth** *Birth to 1 Month:* • Abacavir 2 mg/kg per dose orally twice daily *Age 1 Month to <3 Months:* • Abacavir 4 mg/kg per dose orally twice daily
Lamivudine	**≥32 Weeks' Gestation at Birth** *Birth to Age 4 Weeks:* • Lamivudine 2 mg/kg/dose orally twice daily *Age >4 Weeks:* • Lamivudine 4 mg/kg per dose orally twice daily
Nevirapine	**≥37 Weeks Gestation at Birth:** *Birth to Age 4 Weeks:* • Nevirapine 6 mg/kg per dose orally twice daily *Age >4 Weeks:* • Nevirapine 200 mg/m^2 of body surface area (BSA) per dose orally twice daily; only make this dose increase for infants with confirmed HIV infection. **Note**: Nevirapine dose adjustment at 4 weeks of age is optional for empiric HIV therapy
	≥34 to <37 Weeks Gestation at Birth *Birth to Age 1 Week:* • Nevirapine 4 mg/kg per dose orally twice daily *Age 1 to 4 Weeks:* • Nevirapine 6 mg/kg per dose orally twice daily

Drug	Drug Doses by Gestation Age at Birth
	Age >4 Weeks: • Nevirapine 200 mg/m^2 of BSA per dose orally twice daily; only make this dose increase for infants with confirmed HIV infection.
	≥32 to <34 Weeks' Gestation at Birth *Birth to Age 2 Weeks* • Nevirapine 2 mg/kg per dose orally twice daily *Age 2 to 4 Weeks* • Nevirapine 4 mg/kg per dose orally twice daily *Age 4 to 6 Weeks* • Nevirapine 6 mg/kg per dose orally twice daily *Age >6 Weeks* • Nevirapine 200 mg/m^2 BSA per dose orally twice daily; only make this dose increase for infants with confirmed HIV infection.
Raltegravir **Note**: If the mother has taken raltegravir 2 to 24 hours prior to delivery, the neonate's first dose of raltegravir should be delayed until 24 to 48 hours after birth; additional antiretroviral drugs should be started as soon as possible.	≥37 Weeks Gestation at Birth and Weighing ≥2 kg *Birth to Age 6 Weeks:*

Body Weight	Volume (Dose) of Raltegravir 10 mg/mL Suspension
Birth to 1 Week: Once Daily Dosing	**Approximately 1.5 mg/kg per dose**
2 to <3 kg	0.4 mL (4 mg) once daily
3 to <4 kg	0.5 mL (5 mg) once daily
4 to <5 kg	0.7 mL (7 mg) once daily
1 to 4 Weeks: Twice Daily Dosing	**Approximately 3 mg/kg per dose**
2 to <3 kg	0.8 mL (8 mg) twice daily
3 to <4 kg	1 mL (10 mg) twice daily
4 to <5 kg	1.5 mL (15 mg) twice daily
4 to 6 Weeks: Twice Daily Dosing	**Approximately 6 mg/kg per dose**
3 to <4 kg	2.5 mL (25 mg) twice daily
4 to <6 kg	3 mL (30 mg) twice daily
6 to <8 kg	4 mL (40 mg) twice daily

Source:

- Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States. Management of infants born to women with HIV: antiretroviral management of newborns with perinatal HIV exposure or HIV infection. January 31,

2023. [HIV.gov]