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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 844-275-6222; 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] Some clinicians repeat HIV testing around 28 weeks of pregnancy, aligning it with syphilis testing to minimize blood draws and to allow time for HIV treatment, if needed. Others also add a third HIV test at delivery. 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 long-acting injectable cabotegravir for HIV PrEP consist of a preferred dual nucleoside reverse transcriptase inhibitor (NRTI) backbone (tenofovir alafenamide-emtricitabine, tenofovir alafenamide plus lamivudine, tenofovir DF-emtricitabine, or tenofovir DF-lamivudine) plus a preferred integrase strand transfer inhibitor (INSTI) anchor drug (bictegravir or dolutegravir).[25] Note that bictegravir is available only as the fixed-dose combination bictegravir-tenofovir alafenamide-emtricitabine. The preferred dual NRTI options are tenofovir alafenamide-emtricitabine, tenofovir alafenamide plus lamivudine, tenofovir-DF-emtricitabine, or tenofovir DF-lamivudine.[25] For individuals who have previously received injectable cabotegravir, the preferred treatment is with a protease inhibitor (PI)-based regimen (twice-daily darunavir boosted with ritonavir plus a preferred NRTI dual backbone); this recommendation is based on concerns about possible future 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 com

bina tions are desi gnat ed as *Pref erre d* for ther apy duri ng p regn ancy whe n cli nical trial data in a dults have dem onst rate d eff icac y and dura bility with acce ptab le to xicit y and ease of use, and preg nanc y-sp ecifi c ph arm acok ineti c 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 shou			

ld 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 during pregnancy or when tryin			

g 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.			

	Advantages	Disadvantages
Tenofov	• 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-	• When combined with dolutegravir, tenofovir alafenamide-emtricitabine is associated with more treatment-emergent obesity in nonpregnant adult women compared to tenofovir DF-emtricitabine. (Notably, the impact on weight gain in pregnancy may be

ir alafena	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.	beneficial, as noted in the Advantages column.)
or Tenofoviralafena	• 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 in pregnancy are similar.	
Tenofovir *or* Te		• Potential concerns about fetal bone and early-life growth abnormalities with tenofovir DF, although clinical findings are reassuring to date • Tenofovir DF has potential renal toxicity; thus, tenofovir DF-based, dual-NRTI combinations should be used with caution in patients with renal insufficiency.

nofovir		
l	**Advantages**	**Disadvantages**
	• Coformulated as a single, once-daily pill; for this reason may be preferred over dolutegravir-based regimens to support adherence • High barrier to resistance • No food requirement • No dose adjustment required in pregnancy • No safety concerns observed • High rates of viral suppression • Bictegravir-tenofovir alafenamide-emtricitabine is a *Preferred* regimen for initial treatment of early (acute) HIV infection without a history of cabotegravir for HIV PrEP	• PK and safety data in pregnancy suggest sufficient efficacy of bictegravir or itus use as a *Preferred* initial agent in pregnancy when there has been no prior antiretroviral experience. Drug levels are lower in the second and third trimester of pregnancy than in nonpregnant or postpartum women and are reduced in later pregnancy to a greater degree for bictegravir than for dolutegravir, but bictegravir levels remained above the protein-adjusted EC_{95} during pregnancy and therefore are anticipated to suppress viral load. • Potential concerns about excess weight gain. • Specific timing and/or fasting recommendations apply if bictegravir is taken with calcium or iron (e.g., in prenatal vitamins). • Bictegravir-tenofovir alafenamide-emtricitabine is not *Preferred* for initial treatment of people with early (acute or recent) HIV infection and a history of cabotegravir exposure for HIV PrEP due to concerns about INSTI resistance mutations, unless genotype testing has demonstrated an absence of INSTI resistance mutations; darunavir boosted with ritonavir is *Preferred* in this situation.
p	• Once-daily dosing • Sufficient data about PK, efficacy, and safety of dolutegravir in pregnancy • High rates of viral suppression	• Potential concerns about excess weight gain. • Do not use dolutegravir-lamivudine in the setting of HBV coinfection without

Preferred	• 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 in scenarios of presentation to care 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 without a history of cabotegravir exposure for HIV PrEP.	another HBV agent. • Specific timing and/or fasting recommendations apply if dolutegravir is taken with calcium or iron (e.g., in prenatal vitamins). • Dolutegravir is not *Preferred* for initial treatment in women with early (acute or recent) HIV infection and a history of cabotegravir exposure for HIV PrEP due to concerns about INSTI resistance mutations; darunavir boosted with ritonavir is *Preferred* in this situation. • In the United States, not available as a fixed-dose combination
	Advantages	**Disadvantages**
Preferred	• Darunavir boosted with ritonavir is a *Preferred* protease inhibitor for initial therapy only in certain circumstances (e.g., exposure to long-acting injectable cabotegravir. See darunavir boosted with ritonavir in the Alternative table).	See darunavir boosted with ritonavir in the Alternative table).

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 When Antiretroviral Therapy Has Never Been Received. June 12, 2025. [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 pregnancy 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 during pregnancy or when 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**
Dolutegravir-abacavir-lamivudine	• Once-daily dosing • Dolutegravir-abacavir-lamivudine is available as a fixed-dose combination. • See *Preferred* Initial Regimens in Pregnancy table for other details on dolutegravir.	• Potential concern dolutegravir • Dolutegravir-abac B*5701 testing be lamivudine below • Do not use dolute dolutegravir-lami coinfection withou • See *Preferred* Init for other details o
Raltegravir plus a *Preferred* Dual-NRTI Backbone	• No safety concerns observed. Like dolutegravir, raltegravir may be particularly useful when drug interactions or the potential for preterm birth with PI-based regimens are a concern. • PK data are available for raltegravir in pregnancy	• Twice-daily dosin due to low drug le during pregnancy • Not available as a

	when using the twice-daily formulation (400 mg twice daily). • Like dolutegravir, raltegravir has been shown to rapidly decrease viral load in pregnancy when presentation to care is late in pregnancy and there is no prior experience with antiretroviral therapy or antiretrovirals (ARV-naive). 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.	• Lower barrier to r this reason, ralteg pregnancy • PK data are not a mg (2 x 600 mg) (raltegravir HD) i • Specific timing ar 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 i bilirubin levels, w the risk of neonat clinically significa kernicterus repor monitoring is rec • 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 antiretroviral therapy. • 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 early (acute or recent) HIV infection and a history of cabotegravir exposure for HIV PrEP.	• Not available as a • Requires twice-da • Requires adminis • PIs may increase
***Alternative* NRTI**	**Advantages**	**Disadvantages**

Regimens		
Abacavir-lamivudine	• Once-daily dosing • Available as a fixed-dose combination • Well-tolerated during pregnancy • Reassuring PK data during pregnancy	• Requires HLA-B*5 Abacavir **should** positive for HLA-B developing a hyp education about h • Now classified as due to inability to and concerns ove • Abacavir is not ac • Abacavir-lamivud (boosted with rito recommended if p >100,000 copies/ • Abacavir is not re for initial treatme the patient previo B*5701 gene vari tenofovir alafenar avoid delays in in while awaiting HL
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	• Overall higher rat some *Preferred* d • Requires enhance suicidality • Increased risk of a observed with efa versus dolutegrav emtricitabine star • Increased risk of t fatigue, hepatoto

	and are not eligible for dolutegravir.	
Rilpivirine-tenofovir DF-emtricitabine *or* Rilpivirine-tenofovir alafenamide-emtricitabine *or* 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 • Requires consider H2 blockers or pr commonly used d • Requires adminis

Abbreviations: ARV = antiretroviral; HBV = hepatitis B virus; INSTI = integrase strand transfer inhibitor; NRTI = nu inhibitor; PI = protease inhibitor; 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 When Antiretroviral Therapy Has Never Been Received. June 12, 2025. [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 bictegravir-tenofovir alafenamide-emtricitabine or a dolutegravir-based 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 viral suppression has been achieved (i.e., HIV RNA ≤50 copies/mL). In pregnancy, achieving undetectable levels quickly is crucial, as lower viral loads—especially ≤50 copies/mL—are linked to the lowest risk of perinatal transmission.
  - 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 (844-275-6222).

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 of 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 regarding 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 scheduled 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] In addition, the pregnant woman's CD4 cell count has no bearing on recommendations regarding cesarean delivery.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 is recommended 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. If, however, antiretroviral therapy is initiated late in pregnancy (with an INSTI-based antiretroviral therapy regimen), rapid viral load reduction would be expected, and some experts would consider extending the pregnancy beyond 38 weeks, with the goal of achieving virologic suppression and avoiding cesarean birth. In this situation, establishing an individualized birth plan to extend the pregnancy past 38 weeks should be done with expert consultation and shared decision-making, and guidance is available from the National Perinatal HIV/AIDS Clinical Consultation Center.
- **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. Accordingly, cesarean delivery is not recommended for the purpose of preventing HIV transmission for pregnant women who have an HIV RNA level of less than 1,000 copies/mL within 4 weeks of delivery.
- **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. 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 bictegravir-tenofovir alafenamide-emtricitabine or dolutegravir plus a preferred dual NRTI backbone (tenofovir alafenamide-emtricitabine, tenofovir alafenamide plus lamivudine, tenofovir DF-emtricitabine, tenofovir DF-lamivudine).[21] If the pregnant woman has been previously exposed to long-acting injectable cabotegravir for HIV PrEP, twice-daily ritonavir-boosted darunavir plus a preferred dual NRTI backbone.[21] 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, the 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] Selection of an appropriate postpartum antiretroviral regimen should be based on recommendations in the Adult and Adolescent ART Guidelines.[48]

Management of the Infant with *In Utero* and/or Intrapartum Exposure 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 three different types of antiretroviral regimens used in the management of newborns with *in utero* or intrapartum exposure to HIV: (1) prophylaxis (one or more medications used as antiretroviral prophylaxis, (2) presumptive HIV therapy (three-drug combinations), and (3) treatment for documented HIV infection of the newborn (three-drug combinations).[49]

Table 3. **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 antiretroviral drugs to a newborn without HIV infecti
Presumptive HIV Therapy	The administration of a three-drug antiretroviral regimen to newborns at e Presumptive HIV therapy is intended to be early treatment for a newborn have documentation of infection; it also serves as enhanced antiretroviral infants at high risk but not yet infected.
HIV Therapy	The administration of a three-drug antiretroviral regimen to infants and ch

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. Care of Infants With Perinatal Exposure to HIV. Antiretroviral Management of Infants With In Utero, Intrapartum, or Breastfeeding Exposure to HIV. June 12, 2025. [HIV.gov]

Neonatal Antiretroviral Medications Based on Risk of HIV Acquisition

All newborns with *in utero* and/or intrapartum exposure to HIV should receive antiretroviral medications in the neonatal period, with the first doses initiated as soon as possible after birth, ideally within 6 hours following delivery.[49] The regimens chosen are based on the neonate's risk of HIV acquisition and the infant's HIV NAT results at birth. The stratified risk of perinatal HIV transmission is estimated primarily by whether the mother received antiretroviral therapy during pregnancy, the mother's HIV RNA level after week 20 gestation, and the mother's HIV RNA within the 4 weeks prior to delivery.[49]

Table 4. **Perinatal Guidelines: Management of Infants Born to Women with HIV Infection**

Antiretroviral Management for Infants With *In Utero* or Intrapartum Exposure to HIV

Clinical Setting	Risk of Acquisition		Neonatal ARV Management[a,b]	
	In Utero	Intrapartum		
High Risk of HIV Acquisition				
HIV RNA ≥50 copies/mL in the 4 weeks prior to delivery Viremia can be documented by lab or presumed by other clinical factors	**High**	**High**	Presumptive HIV therapy using a three-drug regimen: • Zidovudine and lamivudine plus nevirapine (treatment dose) *or*	Virem immec confer *utero* transn

Clinical Setting	Risk of Acquisition		Neonatal ARV Management[a,b]	
	In Utero	Intrapartum		
(e.g., new diagnosis, ART adherence problems, reports of having stopped ART prior to delivery).			• Zidovudine and lamivudine plus raltegravir Duration is from birth for 2–6 weeks.[c] If the duration of a three-drug regimen is <6 weeks, and the birth NAT is negative, zidovudine should be continued alone to complete a total of 6 weeks of prophylaxis. HIV NAT obtained before or immediately after starting presumptive therapy with three drugs[d,]	Plasm 50–20 expec than t but co of poo conce viremi
Low Risk of Acquisition				
HIV RNA <50 copies/mL from 20 weeks' gestation through delivery Ideally documented by at least two consecutive tests at least four weeks apart with HIV RNA <50 copies/mL, **but can be based on clinical judgment of providers.**	**Low**	**Low**	Zidovudine for 2 weeks	Sustai suppre gestat extren transn intrap Althou *utero* have b to 20 low fre events presur approa
Other Clinical Scenarios				
HIV RNA ≥50 copies/mL at >20 weeks' gestation, but HIV RNA <50 copies/mL in the 4 weeks prior to delivery	**Low to Moderate**	**Low**	**HIV NAT at Birth[d,e]** *Two Options for ARV Management* • Presumptive HIV therapy with a three-drug regimen, as described above for infants at high risk. If at birth the HIV NAT is negative, de-escalate the prophylaxis regimen to zidovudine alone to complete 2–6 weeks total.[c] • ZDV prophylaxis for 2–6 weeks	Virem and th risk of (increa HIV RN durati *Option* memb potent treatm acquir *utero* HIV th *Option* memb margi and ar freque

Clinical Setting	Risk of Acquisition		Neonatal ARV Management[a,b]	
	In Utero	Intrapartum		
				utero the ad and pc presur favor only. All infa minim zidovu up to when assess
Early (acute or recent) HIV at any point during pregnancy	**Moderate to High** (depending on maternal HIV RNA levels and weeks' gestation)	**High** (if HIV RNA ≥50 copies/mL in the last 4 weeks of pregnancy)	HIV NAT at birth[d,e] Manage infant ARVs according to the level and timing of the maternal viremia as described in the rows above (just as for an infant exposed to established infection).	Early at any is a ur very h place HIV ac For inf expos infecti increa occurs Some manag presur where use it weeks
Unconfirmed maternal HIV status with at least one positive HIV test at delivery or postpartum *or* Newborn has a positive HIV antibody test	**High/Uncertain**	**High/Uncertain**	HIV NAT at birth[d,e] Presumptive HIV therapy with a three-drug regimen as described above for newborns with a high risk of *in utero* or intrapartum HIV acquisition If supplemental testing confirms a negative maternal HIV status, discontinue infant ARV drugs immediately.	Supple testing the inf determ and ne presur initiate

Abbreviations: ARV = antiretroviral; ART = antiretroviral therapy

[a] Infant ARVs should be initiated in the first 6 hours after delivery, especially for infants with a high risk of acquisitio

[b] See Perinatal guidelines for management of HIV-2 Infection and Pregnancy

[c] The optimal duration of three-drug regimen in newborns who are at a high risk for HIV acquisition is unknown. New high risk for HIV acquisition should receive the zidovudine component for 6 weeks. The other two ARVs, (lamivudine nevirapine) *or* (lamivudine and raltegravir), may be administered for 2 to 6 weeks; the recommended duration for tr ARVs varies depending on infant HIV NAT results, maternal viral load at the time of delivery, and the additional risk transmission. Consultation with an expert in pediatric HIV is recommended when selecting a therapy duration becau be based on case-specific risk factors and interim infant HIV NAT results.

Clinical Setting	Risk of Acquisition		Neonatal ARV Management[a,b]	
	In Utero	Intrapartum		

[d] NAT test at birth should be obtained before or immediately after starting ARVs.
[e] When a newborn HIV NAT is positive, infant ART should be initiated without waiting for the results of confirmatory the low likelihood of a false-positive HIV NAT.

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. Care of Infants With Perinatal Exposure to HIV. Antiretroviral Management of Infants With In Utero, Intrapartum, or Breastfeeding Exposure to HIV. June 12, 2025. [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 weight and gestational age.[49]

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

Drug Dosing Recommendations for Antiretroviral Prophylaxis and Presumptive HIV Therapy in Infants With *In Utero* or Intrapartum Exposure to HIV[a]

Drug	Drug Doses by Gestation Age at Birth
Zidovudine (ZDV) 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 ≤6 Weeks* • Zidovudine 4 mg/kg per dose orally twice daily or alternative simplified weight-band dosing (see below) **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 Weeks*

Drug	Drug Doses by Gestation Age at Birth
	• Zidovudine 3 mg/kg per dose orally twice daily
	<30 Weeks Gestation at Birth *Birth to Age 4 Weeks* • Zidovudine 2 mg/kg per dose orally twice daily *Age 4 Weeks to ≤6 Weeks* • Zidovudine 3 mg/kg per dose orally twice daily
Lamivudine (3TC)	**≥32 Weeks Gestation at Birth** *Birth to Age <4 Weeks* • Lamivudine 2 mg/kg/dose orally twice daily *Age ≥4 Weeks to ≤6 Weeks* • Lamivudine 4 mg/kg per dose orally twice daily
Nevirapine (NVP)[b] **Note:** These are nevirapine treatment doses for a presumptive HIV therapy regimen. **Note:** Do not use nevirapine if HIV-2 infection (or HIV-2 co-infection with HIV-1) is present or suspected;	**≥37 Weeks Gestation at Birth:** *Birth to Age ≤6 Weeks* • Nevirapine 6 mg/kg per dose orally twice daily
	≥34 Weeks to <37 Weeks Gestation at Birth *Birth to Age <1 Week* • Nevirapine 4 mg/kg per dose orally twice daily *Age ≥1 Week to ≤6 Weeks* • Nevirapine 6 mg/kg per dose orally twice daily
	≥32 Weeks to <34 Weeks Gestation at Birth *Birth to Age 2 Weeks* • Nevirapine 2 mg/kg per dose orally twice daily *Age ≥2 Weeks to 4 Weeks* • Nevirapine 4 mg/kg per dose orally twice daily

Drug	Drug Doses by Gestation Age at Birth
	Age ≥4 to ≤6 Weeks • Nevirapine 6 mg/kg per dose orally twice daily
Raltegravir (RAL)	≥37 Weeks Gestation at Birth and Weighing ≥2 kg[c] *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
Abacavir[d] **Note:** Abacavir is NOT recommended as part of three-drug regimen for newborns with HIV exposure. However, in situations where zidovudine is not available, or the infant has zidovudine-associated toxicity, abacavir could be considered an alternative to zidovudine.	**≥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

[a]The optimal duration of three-drug regimens for newborns at high risk of HIV acquisition is unknown; all infants should receive the ZDV

Drug	Drug Doses by Gestation Age at Birth
component of the three-drug regimen for 6 weeks. The other two ARVs, (3TC and NVP) *or* (3TC and RAL), may be administered for 2 to 6 weeks; the recommended duration for these ARVs varies depending on infant HIV NAT results, maternal viral load of the birthing parent at the time of delivery, and additional risk factors for HIV transmission. 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. [b]The NVP doses for infants ≥32 to <37 weeks gestation at birth and infants ≥37 weeks gestation at birth are not yet approved by the FDA. The FDA also has not approved a dose of NVP for infants aged <1 month. The doses for infants ≥32 to <34 weeks gestation at birth are based on modeling and might underestimate potential toxicity in infants of 32 to <34 weeks gestational age because the doses used to develop the model were lower than the doses now recommended. [c]RAL dosing is increased at 1 week and 4 weeks of age because metabolism by UGT1A1 is low at birth and increases rapidly during the next 4 to 6 weeks of life. No dosing information is available for preterm infants or infants weighing <2 kg at birth. The current dosing regimen with two dose changes in the first month of life may be challenging for some families. To minimize dosing changes, some experts increase to the 3-mg/kg twice-daily dose upon discharge on day 4 or 5 of life. [d]ABC is approved by the FDA for use in children aged ≥3 months when administered as part of an ARV regimen. ABC also has been reported to be safe in infants and children ≥1 month of age. More recently, an ABC dosing recommendation using PK simulation models has been endorsed by the WHO using weight-band dosing for full-term infants from birth to 1 month of age. ABC substitution for ZDV should be considered in circumstances where increased risk of ZDV toxicity may exist, such as in infants with anemia or neutropenia. Because of ABC-associated hypersensitivity, negative testing for HLA-B*5701 allele should be confirmed prior to the administration of ABC.	

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. Care of Infants With Perinatal Exposure to HIV. Antiretroviral Management of Infants With In Utero, Intrapartum, or Breastfeeding Exposure to HIV. June 12, 2025. [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.[50] 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.[50] 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.[51] 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.[51] 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 considered to have high-risk for perinatal acquisition of HIV should have 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. Infants with a low risk of perinatal HIV exposure (who are not breastfed) 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; testing at birth is not required but should be considered if there is concern for follow-up. For low-risk infants who are breastfed, birth HIV testing is recommended (Figure 6).[51] For infants who received presumptive HIV therapy, the HIV testing should be repeated at 2 to 6 weeks after the antiretroviral therapy is stopped; this typically corresponds with the 2-3 month testing.
- **Recommended Subsequent Testing for Breastfed Infants**: For infants with perinatal exposure who have breastfeeding continue after the infant is 6 months of age, NAT testing should be continued and performed every 3 months.[51] Further, HIV NAT should be obtained at 6 weeks, 3 months, and 6 months after cessation of breastfeeding, regardless of the age when breastfeeding is stopped.[51]
- **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.[50,51]
- **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.[50,51]
- **Presumptive Exclusion of HIV**: In non-breastfed infants, HIV can presumptively be excluded when any of the following criteria are met: (1) two or more negative HIV NATs (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.[51]
- **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.[51]
- **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.[51]

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.[50] The preferred agent for *Pneumocystis* pneumonia prophylaxis in neonates is trimethoprim-sulfamethoxazole.[52]

The prophylaxis for *Pneumocystis* pneumonia can be discontinued if the HIV diagnosis in the child is presumptively or definitively excluded.

Postpartum Follow-Up for Women with HIV

Infant Feeding recommendations in the United States

All pregnant women should receive counseling on breastfeeding.[53] The options and recommendations in the Perinatal HIV Clinical Guidelines for breastfeeding and infant feeding, as outlined below, should be informed by whether the mother is taking antiretroviral therapy and has suppressed plasma HIV RNA levels.[49,53] If the mother indicates a desire for breastfeeding, discussions and plans for infant antiretroviral prophylaxis during breastfeeding should take place during the antepartum period and be readdressed at birth and at regular intervals.

- **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.
- **Mother has 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.[53,54,55] 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.

Antiretroviral Therapy for Infants When Mother is Breastfeeding

For those women with sustained viral suppression who choose to breastfeed, due to lack of data, there is no consensus on the optimal antiretroviral therapy regimen and duration for infants. Most 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.[49] The following summarizes recommendations for infant antiretroviral therapy based on the mother’s HIV RNA levels.[49]

Sustained Maternal Viral Suppression (HIV RNA

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 for women who have never previously received antiretrovirals, including long-acting injectable cabotegravir, consist of bictegravir-tenofovir alafenamide-emtricitabine or dolutegravir plus a preferred dual NRTI backbone tenofovir alafenamide, tenofovir alafenamide plus lamivudine, tenofovir DF-emtricitabine, or tenofovir DF-lamivudine).

- 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.

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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.

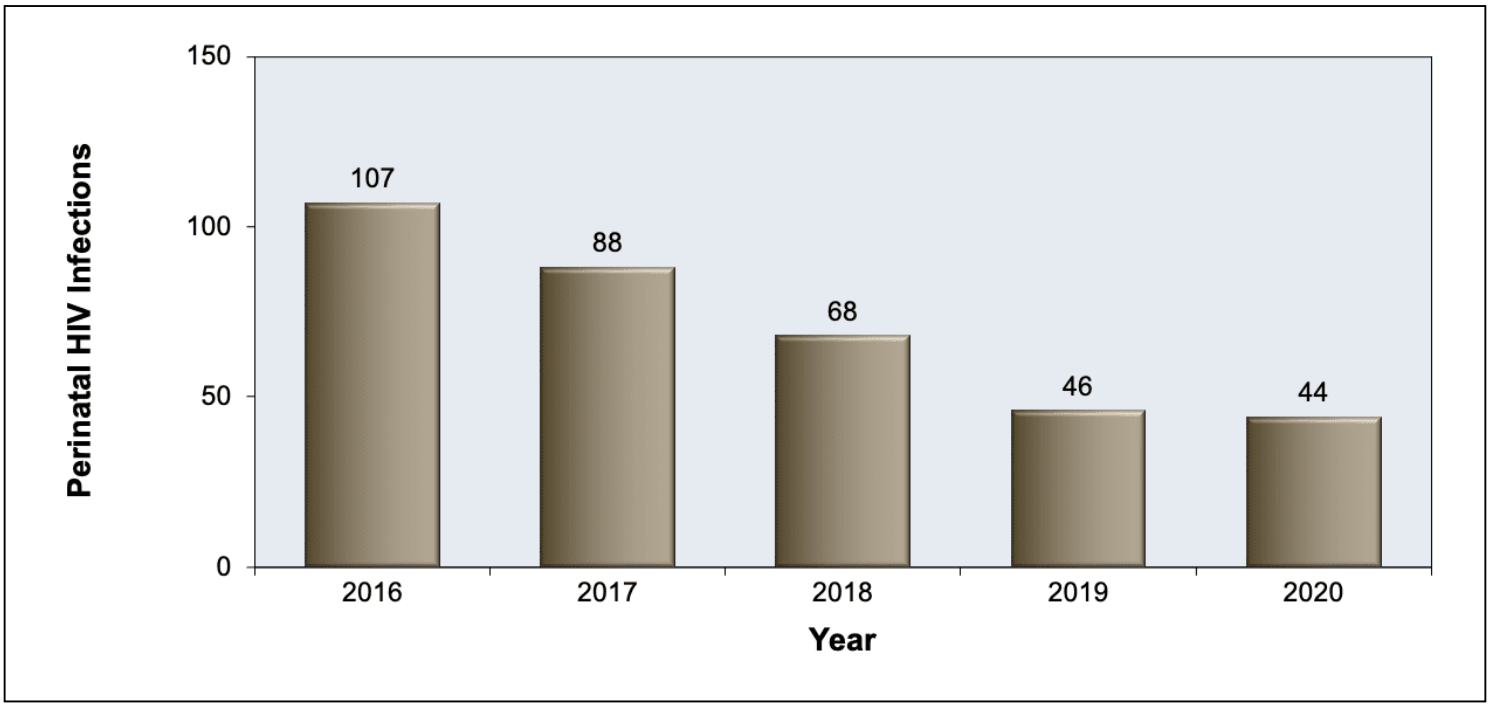

Figure 2 Pediatric AIDS Clinical Trials Group Protocol 076

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.

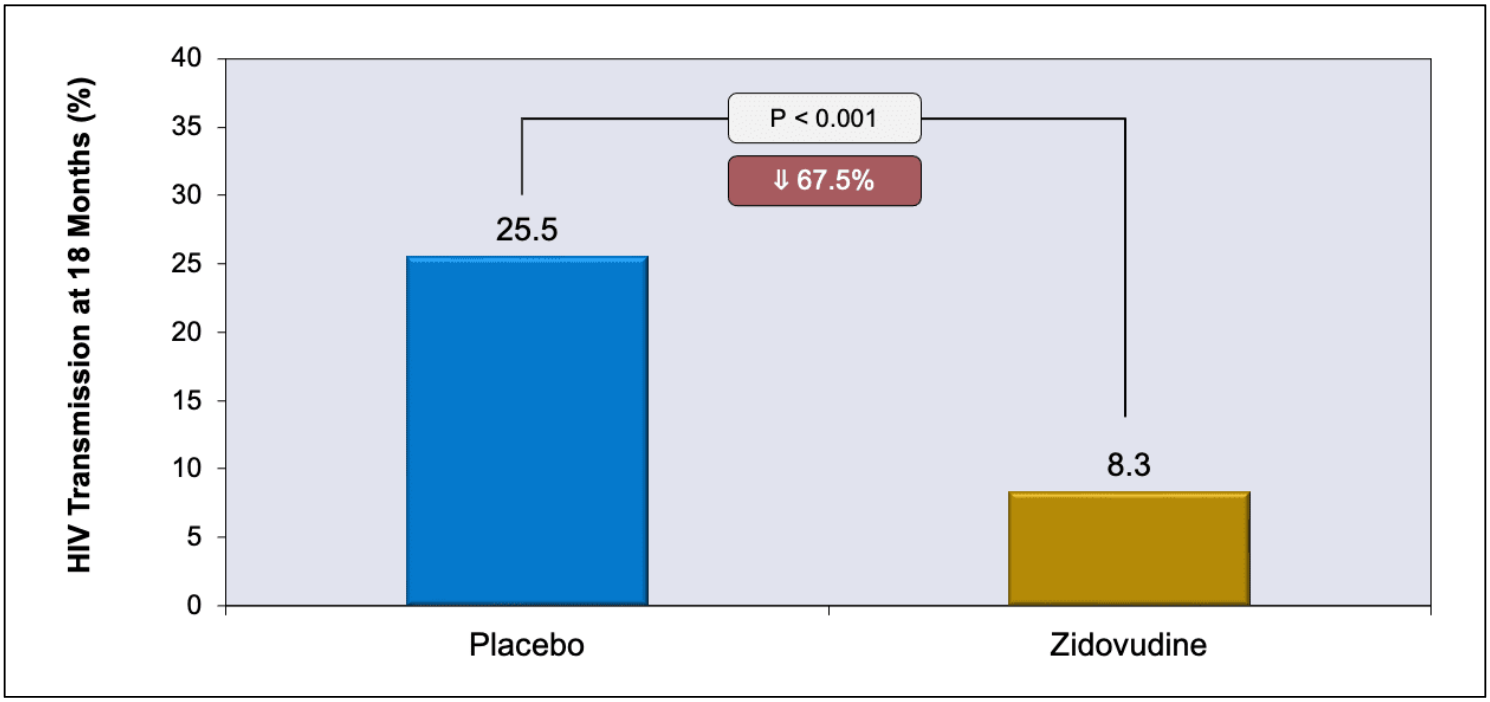

Figure 3 Timing of Abbreviated Regimens of Zidovudine and Risk of Perinatal HIV Transmission

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.

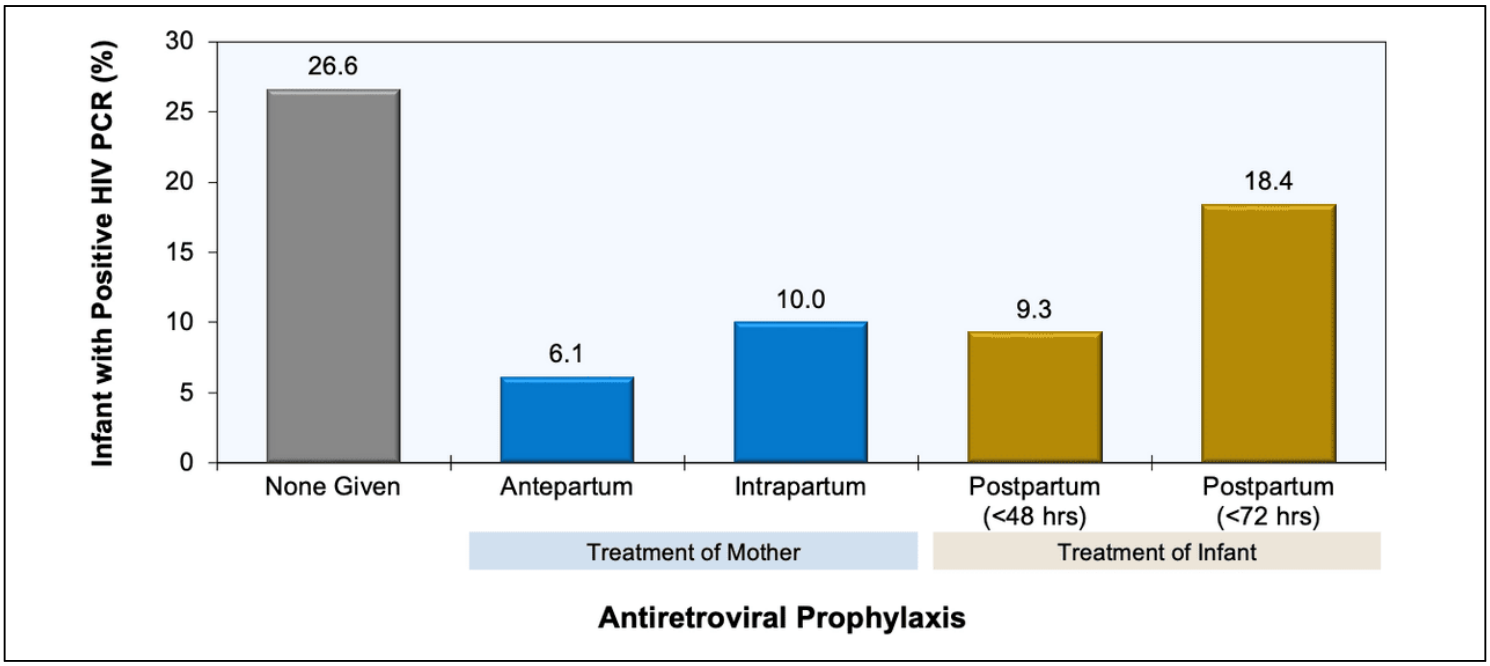

Figure 4 Antenatal Antiretroviral Therapy and Impact on Perinatal HIV Transmission

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.

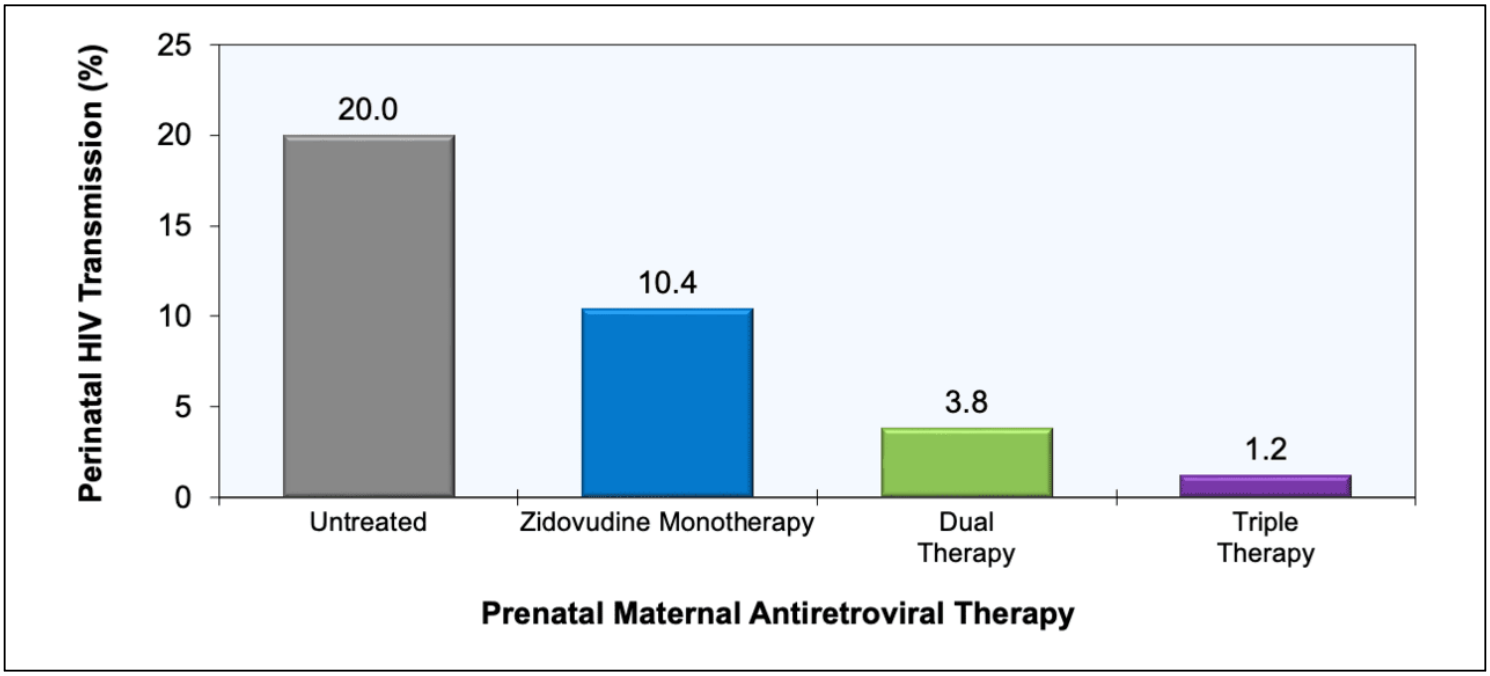

Figure 5 Perinatal HIV-1 Transmission Rates According to HIV RNA Level at Delivery: The ANRS French Perinatal Cohort (1997–2004)

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.

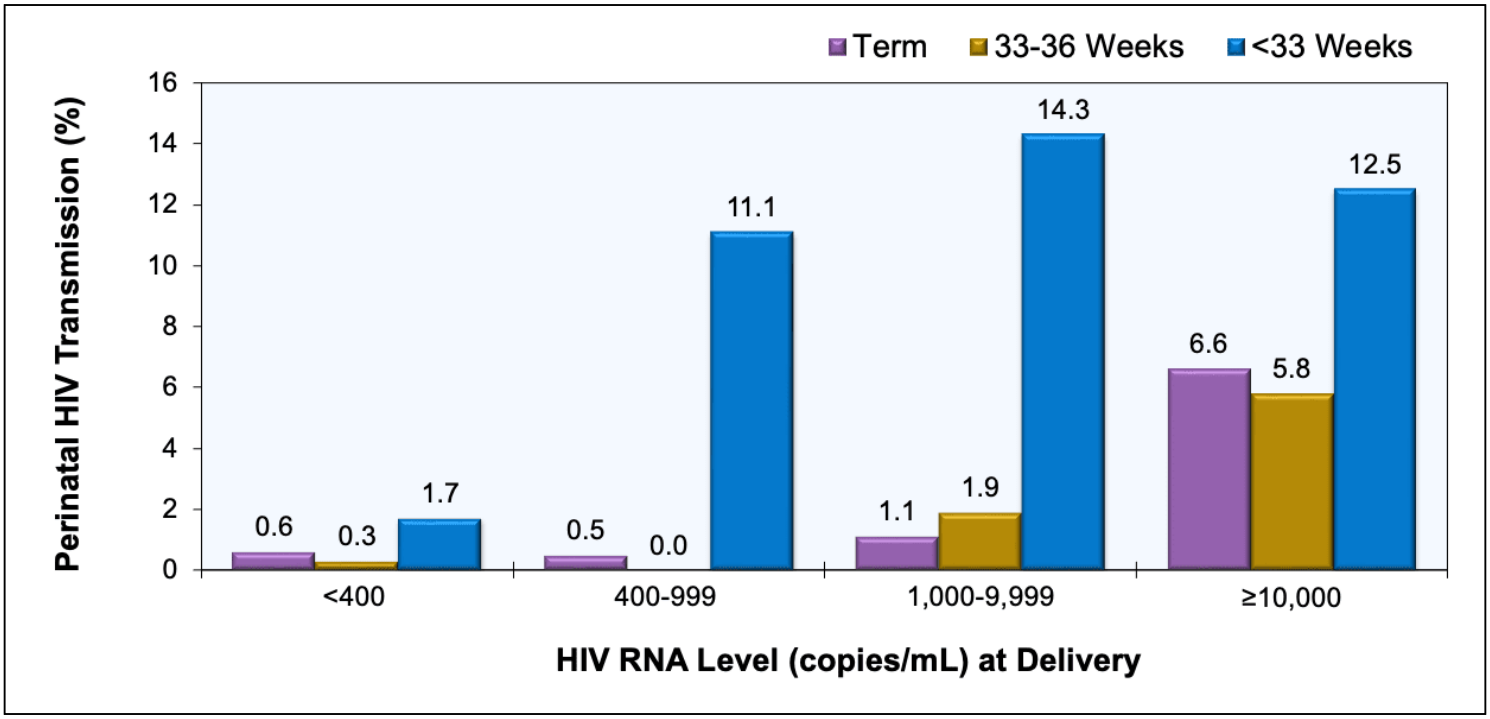

Figure 6 Recommended Virologic Testing Schedules for Infants Exposed to HIV by Perinatal HIV Transmission Risk

Abbreviations: NAT = nucleic acid test
*High-risk=infants with mothers who had viremia (HIV RNA ≥50 copies/mL) in the 4 weeks prior to delivery, early (acute or recent) HIV during pregnancy, or HIV diagnosed in labor or postpartum.
†Low Risk= infants with mothers who had sustained viral suppression (HIV RNA<50 copies/mL from 20 weeks of gestation through delivery.
‡Not necessary for infants at low risk of HIV acquisition unless there are concerns that the newborn could be lost to follow-up without further testing.

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. May 19, 2025.

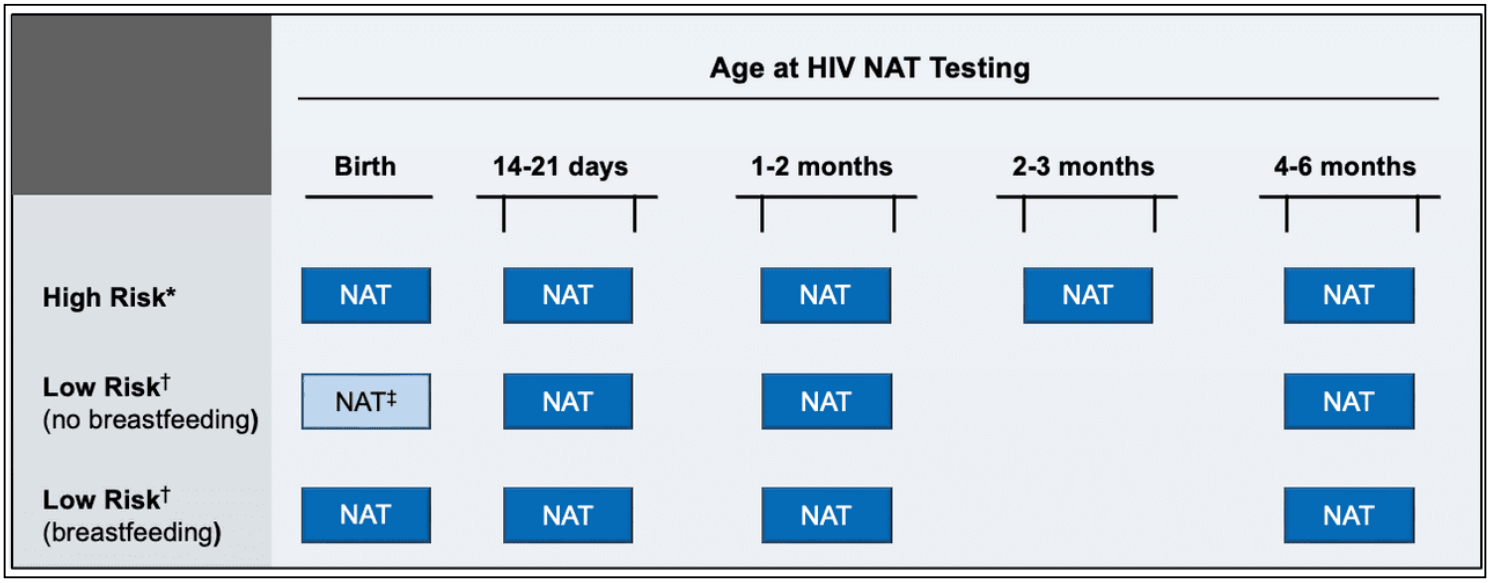

Table 1. **Perinatal Guidelines: Recommendations for Use of Antiretroviral Drugs During Pregnancy**

***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 during pregnancy or when 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**
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 con tenofovir associate emergent women co emtricitab weight ga beneficial 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 in pregnancy are similar.	
Tenofovir DF-emtricitabine *or* Tenofovir DF plus lamivudine		• Potential early-life tenofovir are reassu • Tenofovir thus, tenc combinati in patient
***Preferred* INSTI Regimens**	**Advantages**	**Disadvantages**
Bictegravir-tenofovir alafenamide-emtricitabine	• Coformulated as a single, once-daily pill; for this reason may be preferred over dolutegravir-based regimens to support adherence • High barrier to resistance • No food requirement	• PK and sa sufficient use as a *P* pregnanc antiretrov

	• No dose adjustment required in pregnancy • No safety concerns observed • High rates of viral suppression • Bictegravir-tenofovir alafenamide-emtricitabine is a *Preferred* regimen for initial treatment of early (acute) HIV infection without a history of cabotegravir for HIV PrEP	lower in t pregnanc postpartu later preg bictegravi bictegravi protein-ac are antici • Potential gain. • Specific ti recomme taken wit prenatal v • Bictegrav emtricitab treatment recent) H cabotegra concerns mutations demonstr resistance with riton
Dolutegravir plus a *Preferred* Dual-NRTI Backbone	• Once-daily dosing • 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 in scenarios of presentation to care 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 without a history of cabotegravir exposure for HIV PrEP.	• Potential gain. • Do not us setting of another H • Specific ti recomme taken wit prenatal v • Dolutegra treatment recent) H cabotegra concerns mutations ritonavir i • In the Uni fixed-dose
***Preferred* PI Regimens**	**Advantages**	**Disadvantages**
Darunavir boosted with ritonavir plus a *Preferred* Dual-NRTI Backbone	• Darunavir boosted with ritonavir is a *Preferred* protease inhibitor for initial therapy only in certain circumstances (e.g., exposure to long-acting injectable cabotegravir. See darunavir boosted with ritonavir in the Alternative table).	See darunavir bo Alternative table)

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 When Antiretroviral Therapy Has Never Been Received. June 12, 2025. [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 pregnancy 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 during pregnancy or when 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**
Dolutegravir-abacavir-lamivudine	• Once-daily dosing • Dolutegravir-abacavir-lamivudine is available as a fixed-dose combination. • See *Preferred* Initial Regimens in Pregnancy table for other details on dolutegravir.	• Potential concern dolutegravir • Dolutegravir-abac B*5701 testing be lamivudine below • Do not use dolute dolutegravir-lami coinfection withou • See *Preferred* Init for other details o
Raltegravir plus a *Preferred* Dual-NRTI Backbone	• No safety concerns observed. Like dolutegravir, raltegravir may be particularly useful when drug interactions or the potential for preterm birth 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 pregnancy when presentation to care is late in pregnancy and there is no prior experience with antiretroviral therapy or antiretrovirals (ARV-naive). 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 repor

		monitoring is rec • 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 antiretroviral therapy. • 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 early (acute or recent) HIV infection and a history of cabotegravir exposure for HIV PrEP.	• Not available as a • Requires twice-da • Requires adminis • PIs may increase
***Alternative* NRTI Regimens**	**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*5 Abacavir **should** positive for HLA-B developing a hyp education about h • Now classified as due to inability to and concerns ove • Abacavir is not ac • Abacavir-lamivud (boosted with rito recommended if p >100,000 copies/ • Abacavir is not re for initial treatme the patient previo

		B*5701 gene vari tenofovir alafenar avoid delays in in while awaiting HL
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 *or* 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 vir trimesters becaus levels. Insufficien • Requires consider H2 blockers or pr commonly used d • Requires adminis

Abbreviations: ARV = antiretroviral; HBV = hepatitis B virus; INSTI = integrase strand transfer inhibitor; NRTI = nu inhibitor; PI = protease inhibitor; 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 When Antiretroviral Therapy Has Never Been Received. June 12, 2025. [HIV.gov]

Table 3. **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 antiretroviral drugs to a newborn without HIV infecti
Presumptive HIV Therapy	The administration of a three-drug antiretroviral regimen to newborns at e Presumptive HIV therapy is intended to be early treatment for a newborn have documentation of infection; it also serves as enhanced antiretroviral infants at high risk but not yet infected.
HIV Therapy	The administration of a three-drug antiretroviral regimen to infants and ch

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. Care of Infants With Perinatal Exposure to HIV. Antiretroviral Management of Infants With In Utero, Intrapartum, or Breastfeeding Exposure to HIV. June 12, 2025. [HIV.gov]

Table 4. **Perinatal Guidelines: Management of Infants Born to Women with HIV Infection**

Antiretroviral Management for Infants With *In Utero* or Intrapartum Exposure to HIV

Clinical Setting	Risk of Acquisition		Neonatal ARV Management[a,b]	
	In Utero	Intrapartum		
High Risk of HIV Acquisition				
HIV RNA ≥50 copies/mL in the 4 weeks prior to delivery Viremia can be documented by lab or presumed by other clinical factors (e.g., new diagnosis, ART adherence problems, reports of having stopped ART prior to delivery).	**High**	**High**	Presumptive HIV therapy using a three-drug regimen: • Zidovudine and lamivudine plus nevirapine (treatment dose) *or* • Zidovudine and lamivudine plus raltegravir Duration is from birth for 2–6 weeks.[c] If the duration of a three-drug regimen is <6 weeks, and the birth NAT is negative, zidovudine should be continued alone to complete a total of 6 weeks of prophylaxis. HIV NAT obtained before or immediately after starting presumptive therapy with three drugs[d,]	Virem immed confer *utero* transm Plasm 50–20 expec than t but co of poo conce viremi
Low Risk of Acquisition				
HIV RNA <50 copies/mL from 20 weeks' gestation through delivery Ideally documented by at least two consecutive tests at least four weeks apart with HIV RNA <50 copies/mL, **but can be based on clinical judgment of providers.**	**Low**	**Low**	Zidovudine for 2 weeks	Sustai suppre gestat extren transm intrap Althou *utero* have b to 20 low fre events presur approa
Other Clinical Scenarios				
HIV RNA ≥50 copies/mL at >20 weeks' gestation, but HIV RNA <50 copies/mL in the 4 weeks prior to delivery	**Low to Moderate**	**Low**	**HIV NAT at Birth[d,e]** *Two Options for ARV Management* • Presumptive HIV therapy with a three-drug regimen, as described above for infants at high risk. If at birth the HIV NAT is negative, de-escalate the	Virem and th risk of (increa HIV RN durati *Optior* memb

Clinical Setting	Risk of Acquisition		Neonatal ARV Management[a,b]	
	In Utero	Intrapartum		
			prophylaxis regimen to zidovudine alone to complete 2–6 weeks total.[c] • ZDV prophylaxis for 2–6 weeks	potent treatm acquir *utero* HIV th *Optior* memb margi and ar freque *utero* the ad and pc presur favor only. All infa minim zidovu up to when assess
Early (acute or recent) HIV at any point during pregnancy	**Moderate to High** (depending on maternal HIV RNA levels and weeks' gestation)	**High** (if HIV RNA ≥50 copies/mL in the last 4 weeks of pregnancy)	HIV NAT at birth[d,e] Manage infant ARVs according to the level and timing of the maternal viremia as described in the rows above (just as for an infant exposed to established infection).	Early at any is a ur very h place HIV ac For inf expos infecti increa occurs Some manag presur where use it weeks
Unconfirmed maternal HIV status with at least one positive HIV test at delivery or postpartum *or* Newborn has a positive HIV antibody test	**High/Uncertain**	**High/Uncertain**	HIV NAT at birth[d,e] Presumptive HIV therapy with a three-drug regimen as described above for newborns with a high risk of *in utero* or intrapartum HIV acquisition If supplemental testing confirms a negative maternal HIV status,	Supple testing the inf deterr and ne presur initiate

Clinical Setting	Risk of Acquisition		Neonatal ARV Management[a,b]	
	In Utero	Intrapartum		
			discontinue infant ARV drugs immediately.	

Abbreviations: ARV = antiretroviral; ART = antiretroviral therapy
[a] Infant ARVs should be initiated in the first 6 hours after delivery, especially for infants with a high risk of acquisitio
[b] See Perinatal guidelines for management of HIV-2 Infection and Pregnancy
[c] The optimal duration of three-drug regimen in newborns who are at a high risk for HIV acquisition is unknown. New high risk for HIV acquisition should receive the zidovudine component for 6 weeks. The other two ARVs, (lamivudine nevirapine) *or* (lamivudine and raltegravir), may be administered for 2 to 6 weeks; the recommended duration for tr ARVs varies depending on infant HIV NAT results, maternal viral load at the time of delivery, and the additional risk transmission. Consultation with an expert in pediatric HIV is recommended when selecting a therapy duration becau be based on case-specific risk factors and interim infant HIV NAT results.
[d] NAT test at birth should be obtained before or immediately after starting ARVs.
[e] When a newborn HIV NAT is positive, infant ART should be initiated without waiting for the results of confirmatory the low likelihood of a false-positive HIV NAT.

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. Care of Infants With Perinatal Exposure to HIV. Antiretroviral Management of Infants With In Utero, Intrapartum, or Breastfeeding Exposure to HIV. June 12, 2025. [HIV.gov]

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

Drug Dosing Recommendations for Antiretroviral Prophylaxis and Presumptive HIV Therapy in Infants With *In Utero* or Intrapartum Exposure to HIV[a]

Drug	Drug Doses by Gestation Age at Birth
Zidovudine (ZDV) 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 ≤6 Weeks* • Zidovudine 4 mg/kg per dose orally twice daily or alternative simplified weight-band dosing (see below) **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 Weeks* • Zidovudine 3 mg/kg per dose orally twice daily
	<30 Weeks Gestation at Birth *Birth to Age 4 Weeks* • Zidovudine 2 mg/kg per dose orally twice daily *Age 4 Weeks to ≤6 Weeks* • Zidovudine 3 mg/kg per dose orally twice daily
Lamivudine (3TC)	**≥32 Weeks Gestation at Birth** *Birth to Age <4 Weeks* • Lamivudine 2 mg/kg/dose orally twice daily *Age ≥4 Weeks to ≤6 Weeks* • Lamivudine 4 mg/kg per dose orally twice daily
Nevirapine (NVP)[b]	**≥37 Weeks Gestation at Birth:** *Birth to Age ≤6 Weeks*

Drug	Drug Doses by Gestation Age at Birth
Note: These are nevirapine treatment doses for a presumptive HIV therapy regimen. **Note:** Do not use nevirapine if HIV-2 infection (or HIV-2 co-infection with HIV-1) is present or suspected;	• Nevirapine 6 mg/kg per dose orally twice daily
	≥34 Weeks to <37 Weeks Gestation at Birth *Birth to Age <1 Week* • Nevirapine 4 mg/kg per dose orally twice daily *Age ≥1 Week to ≤6 Weeks* • Nevirapine 6 mg/kg per dose orally twice daily
	≥32 Weeks to <34 Weeks Gestation at Birth *Birth to Age 2 Weeks* • Nevirapine 2 mg/kg per dose orally twice daily *Age ≥2 Weeks 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
Raltegravir (RAL)	≥37 Weeks Gestation at Birth and Weighing ≥2 kg[c] *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
Abacavir[d] **Note:** Abacavir is NOT recommended as part of three-drug regimen for newborns with HIV exposure. However, in situations where zidovudine is not available, or the infant has zidovudine-associated toxicity,	**≥37 Weeks Gestation at Birth** *Birth to ≤1 Month* • Abacavir 2 mg/kg per dose orally twice daily

Drug	Drug Doses by Gestation Age at Birth
abacavir could be considered an alternative to zidovudine.	*Age ≥1 Month to <3 Months* • Abacavir 4 mg/kg per dose orally twice daily

[a]The optimal duration of three-drug regimens for newborns at high risk of HIV acquisition is unknown; all infants should receive the ZDV component of the three-drug regimen for 6 weeks. The other two ARVs, (3TC and NVP) *or* (3TC and RAL), may be administered for 2 to 6 weeks; the recommended duration for these ARVs varies depending on infant HIV NAT results, maternal viral load of the birthing parent at the time of delivery, and additional risk factors for HIV transmission. 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.

[b]The NVP doses for infants ≥32 to <37 weeks gestation at birth and infants ≥37 weeks gestation at birth are not yet approved by the FDA. The FDA also has not approved a dose of NVP for infants aged <1 month. The doses for infants ≥32 to <34 weeks gestation at birth are based on modeling and might underestimate potential toxicity in infants of 32 to <34 weeks gestational age because the doses used to develop the model were lower than the doses now recommended.

[c]RAL dosing is increased at 1 week and 4 weeks of age because metabolism by UGT1A1 is low at birth and increases rapidly during the next 4 to 6 weeks of life. No dosing information is available for preterm infants or infants weighing <2 kg at birth. The current dosing regimen with two dose changes in the first month of life may be challenging for some families. To minimize dosing changes, some experts increase to the 3-mg/kg twice-daily dose upon discharge on day 4 or 5 of life.

[d]ABC is approved by the FDA for use in children aged ≥3 months when administered as part of an ARV regimen. ABC also has been reported to be safe in infants and children ≥1 month of age. More recently, an ABC dosing recommendation using PK simulation models has been endorsed by the WHO using weight-band dosing for full-term infants from birth to 1 month of age. ABC substitution for ZDV should be considered in circumstances where increased risk of ZDV toxicity may exist, such as in infants with anemia or neutropenia. Because of ABC-associated hypersensitivity, negative testing for HLA-B*5701 allele should be confirmed prior to the administration of ABC.

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. Care of Infants With Perinatal Exposure to HIV. Antiretroviral Management of Infants With In Utero, Intrapartum, or Breastfeeding Exposure to HIV. June 12, 2025. [HIV.gov]