



Recommendations for Use of Antiretroviral Drugs in Pregnant HIV-1-Infected Women for Maternal Health and Interventions to Reduce Perinatal HIV Transmission in the United States

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Intrapartum Antiretroviral Therapy/Prophylaxis

Panel's Recommendations

- Women should continue their antepartum combination antiretroviral therapy (ART) drug regimen on schedule as much as possible during labor and before scheduled cesarean delivery (**AIII**).
- Intravenous (IV) zidovudine should be administered to HIV-infected women with HIV RNA >1,000 copies/mL (or unknown HIV RNA) near delivery (**AI**), but is not required for HIV-infected women receiving ART regimens who have HIV RNA ≤1,000 copies/mL during late pregnancy and near delivery and no concerns regarding adherence to the ART regimen (**BII**). Scheduled cesarean delivery at 38 weeks' gestation (compared to 39 weeks for most indications) is recommended for women who have HIV RNA >1,000 copies/mL near delivery (see [Transmission and Mode of Delivery](#)) (**AI**).
- Women who present in labor with unknown HIV status should undergo expedited **antigen/antibody** HIV testing (**AII**). If the results are positive, an **HIV-1/HIV-2 antibody differentiation** test should be done as soon as possible and maternal (IV zidovudine)/infant (combination antiretroviral [ARV] prophylaxis) ARV drugs should be initiated pending results of the differentiation test (**AII**). If the maternal HIV differentiation test is positive, infant ARV drugs should be managed as discussed in the [Infant Antiretroviral Prophylaxis](#) section (**AI**). If the maternal HIV differentiation test is negative **and acute HIV infection has been excluded with a negative HIV RNA test**, the maternal and infant ARV drugs should be stopped (**AIII**). **Women with positive initial testing should not initiate breastfeeding until HIV infection is definitively ruled out (see [Postpartum Care](#)) (**AII**).**

Rating of Recommendations: A = Strong; B = Moderate; C = Optional

Rating of Evidence: I = One or more randomized trials with clinical outcomes and/or validated laboratory endpoints; II = One or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; III = Expert opinion

Women Who Have Received Antepartum Antiretroviral Drugs

Use of Intravenous Zidovudine During Labor

The PACTG 076 zidovudine regimen included a continuous intravenous (IV) infusion of zidovudine during labor for all women. Antiretroviral therapy (ART) regimens are now recommended for all pregnant women **regardless of CD4 T lymphocyte (CD4) cell count and HIV viral load** for treatment of HIV and prevention of perinatal transmission of HIV; the additional benefit of IV zidovudine in women receiving combination regimens has not been evaluated in randomized clinical trials.

The French Perinatal Cohort evaluated transmission in more than 11,000 HIV-infected pregnant women receiving antiretroviral (ARV) drugs (10% zidovudine alone, 18% dual ARV, and 72% triple ARV) who delivered between 1997 and 2010, stratified by viral load at delivery; 95% received IV intrapartum zidovudine.¹ The overall rate of perinatal transmission was 0.9% (95/10,239) with IV zidovudine and 1.8% (9/514, $P = 0.06$) without IV zidovudine. Among women with HIV RNA <1,000 copies/mL at delivery, no transmission occurred among 369 who did not receive IV zidovudine compared to a rate of 0.6% (47/8,132, $P > 0.20$) among those receiving IV zidovudine. Among women with HIV RNA >1,000 copies/mL, the risk of transmission was increased without IV zidovudine (10.2%) compared to 2.5% with IV zidovudine ($P < 0.01$) if neonates received only zidovudine for prophylaxis, but was no different (4.8% vs. 4.1%, $P = 0.83$) without or with intrapartum zidovudine if the neonate received intensified prophylaxis with two or more ARV drugs. In a cohort of 717 women delivering between 1996 and 2008 in Miami, the majority of whom were receiving an ART regimen and had HIV RNA <1,000 copies/mL at delivery, lack of receipt of IV zidovudine during labor was not associated with an increased risk of transmission.² Among a European cohort of infants considered at high risk of transmission, lack of IV zidovudine in labor was associated with transmission on univariate analysis but was not significantly associated once adjusted for maternal HIV RNA and other factors (adjusted odds ratio with IV zidovudine 0.79; 95% confidence interval, 0.55–1.15; $P = 0.23$).³ In a cohort of Irish women receiving ART for at least 4 weeks before delivery with HIV RNA <1,000 copies/mL, no transmission occurred among 61 who received either no zidovudine in labor or <4 hours of IV zidovudine.⁴

Based on these studies, IV zidovudine is not required for HIV-infected women receiving ART with HIV RNA $\leq 1,000$ copies/mL in late pregnancy and/or near delivery and for whom there are no concerns about adherence to or tolerance of their ART regimens; IV zidovudine should continue to be administered to HIV-infected women with HIV RNA $> 1,000$ copies/mL near delivery (or unknown HIV RNA levels), regardless of antepartum regimen.

Previously, these guidelines specified that the threshold for not requiring intrapartum IV zidovudine was < 400 copies/mL. However, based on more recent studies that have used a threshold of 1,000 copies/mL,^{1,2,4} a threshold of $\leq 1,000$ copies/mL is now recommended for consideration to not administer IV zidovudine. This recommendation is now consistent with the mode of delivery recommendations that specify that a scheduled cesarean delivery is not recommended for women receiving ART with plasma HIV RNA levels $\leq 1,000$ copies/mL **and no concerns about adherence**. However, regardless of viral load, the clinician may elect to use intrapartum IV zidovudine based on clinical judgement.

In women with HIV RNA $> 1,000$ copies/mL undergoing a scheduled cesarean delivery for prevention of transmission, IV zidovudine administration should begin 3 hours before the scheduled operative delivery. This recommendation is based on a pharmacokinetic (PK) study of zidovudine given orally during pregnancy and as a continuous infusion during labor. Maternal zidovudine levels were measured at baseline, after the initial IV loading dose, and then every 3 to 4 hours until delivery, and in cord blood.⁵ Systemic and intracellular zidovudine levels increased from baseline but appeared to stabilize after 3 hours of infusion; cord blood zidovudine levels were associated with maternal levels and maternal infusion duration. If cesarean delivery is being performed for other indications and maternal viral load is $\leq 1,000$ copies/mL near the time of delivery, administration of IV zidovudine is not required.

If zidovudine was not used in the antenatal ART regimen because of known or suspected zidovudine resistance, intrapartum use of the drug is still recommended in women with HIV RNA $> 1,000$ copies/mL near delivery, except in women with documented histories of hypersensitivity. This intrapartum use of the drug is recommended because of the unique characteristics of zidovudine and its proven record in reducing perinatal transmission, even in the presence of maternal resistance to the drug (see [Antiretroviral Drug Resistance and Resistance Testing in Pregnancy](#)).

In some international studies, oral rather than IV zidovudine has been administered during labor. Data are limited on the PKs of oral compared with IV zidovudine during labor. In studies of oral dosing in labor, levels were lower than with IV dosing, and PK parameters suggested erratic absorption during labor.^{6,7} Therefore, in women with HIV RNA $> 1,000$ copies/mL near delivery for whom zidovudine is recommended, IV would be preferred to oral administration in the United States; in situations where IV administration is not possible, oral administration of zidovudine using a 600-mg loading dose and 400 mg every 3 hours⁷ can be considered.

Continuation of Antenatal Antiretroviral Drugs during Labor

Women who are receiving an antepartum ART regimen should continue that regimen on schedule as much as possible during the intrapartum period to provide maximal virologic effect and to minimize the chance of development of drug resistance. If the woman's HIV-1 RNA level is $> 1,000$ copies/mL and oral zidovudine is part of the antepartum regimen, the oral zidovudine component of the regimen can be held while she receives IV zidovudine. When cesarean delivery is planned, oral medications can be continued preoperatively with sips of water. Medications requiring food ingestion for absorption can be taken with liquid dietary supplements, contingent on consultation with the attending anesthesiologist in the preoperative period. If the maternal ARV drug regimen must be interrupted temporarily (meaning for less than 24 hours) during the peripartum period, all drugs should be stopped and reinstated simultaneously to minimize the chance that resistance will develop.

Women Who Have Received Antepartum Antiretroviral Drugs But Have Suboptimal Viral Suppression Near Delivery

Women who have received ART regimens may not achieve complete viral suppression by the time of delivery because of factors such as difficulty with adherence, viral resistance, or late entry into care.

Regardless of the reason, all women who have HIV RNA levels >1,000 copies/mL near the time of delivery should be offered a scheduled cesarean delivery at 38 weeks, which may significantly reduce the risk of transmission (see [Transmission and Mode of Delivery](#)).

Women with HIV RNA levels above 1,000 copies/mL at the time of delivery should receive IV zidovudine along with their other ARVs orally, as described above. While additional maternal ART such as single-dose nevirapine is not recommended, in certain high-risk situations, additional medications for prophylaxis in infants may be warranted, such as in cases where maternal HIV RNA levels are high at or near the time of delivery, especially if delivery is not a scheduled cesarean (see [Infant Antiretroviral Prophylaxis](#) and [Table 7](#)).

Women Who Have Not Received Antepartum Antiretroviral Drugs

Women Who Present in Labor without Documentation of HIV Status

All women without documentation of HIV status at the time of labor should be screened for HIV with expedited testing unless they decline (opt-out screening). Expedited repeat HIV testing is also recommended for women presenting in labor who tested negative for HIV in early pregnancy but are at increased risk of HIV infection and were not retested in the third trimester.⁸ Factors that may increase risk of infection include diagnosis of a sexually transmitted disease, illicit drug use, exchange of sex for money or drugs, multiple sexual partners during pregnancy, a sexual partner at risk of or with known HIV infection, signs/symptoms of acute HIV infection, or living in a region with an elevated incidence of HIV in women of childbearing age.⁸ Initial testing for HIV should be done with a Food and Drug Administration (FDA)-approved antigen/antibody combination immunoassay that detects HIV-1 and HIV-2 antibodies for established infection with HIV-1 or HIV-2 and HIV-1 p24 antigen to screen for acute HIV-1 infection. No further testing is required for specimens that are nonreactive on the initial immunoassay. Women with positive initial antigen/antibody combination immunoassay result should be tested with an FDA-approved antibody immunoassay that differentiates HIV-1 antibodies from HIV-2 antibodies. Reactive results on the initial antigen/antibody combination immunoassay and the HIV-1/HIV-2 antibody differentiation immunoassay should be interpreted as positive for HIV-1 antibodies; HIV-2 antibodies; or HIV antibodies, undifferentiated (see [Revised Recommendations for HIV Testing in Adults, Adolescents, and Pregnant Women in Health-Care Settings](#)).

Expedited HIV testing should be available on a 24-hour basis at all facilities with a maternity service and/or neonatal intensive care unit (NICU). Statutes and regulations regarding expedited testing vary from state to state (see <http://nccc.ucsf.edu/clinical-resources/hiv-aids-resources/state-hiv-testing-laws> for a review of state HIV testing laws). Current information about testing also should be available at all facilities with a maternity service and/or NICU.

Women who test positive on the initial test should be presumed to be infected until follow up testing clarifies their infection status. IV zidovudine should be started immediately in all women with positive initial HIV tests in labor to prevent perinatal transmission of HIV, as discussed below. Women with positive initial testing should not initiate breastfeeding until HIV infection is definitively ruled out.

In the postpartum period, along with follow-up HIV testing, these women should receive appropriate assessments as soon as possible to determine their health status, including CD4 cell count, HIV-1 RNA viral load, and HIV genotype for resistance. Arrangements also should be made for establishing HIV care and providing ongoing psychosocial support after discharge. If the follow-up antibody testing is negative, an HIV RNA test should be done to rule out acute infection as a cause of the initial positive test before ART is stopped (see [Acute Infection in Pregnancy](#)).

Choice of Intrapartum/Postpartum Antiretroviral Regimen for Women without Antepartum Antiretroviral Therapy

All HIV-infected women who have not received antepartum ARV drugs should have IV zidovudine started immediately to prevent perinatal transmission of HIV. Although intrapartum/neonatal ARV medications will not prevent perinatal transmission that occurs before labor, most transmission occurs near to or during labor

and delivery. Pre-exposure prophylaxis for the fetus can be provided by giving mothers a drug that rapidly crosses the placenta, producing fetal systemic ARV drug levels during intensive exposure to HIV in maternal genital secretions and in blood during birth. In general, zidovudine and other nucleoside reverse transcriptase inhibitors, non-nucleoside reverse transcriptase inhibitors, and **the integrase inhibitor raltegravir** cross the placenta well, whereas protease inhibitors do not (see [Table 8](#)). **Data on placental transfer of other integrase inhibitors are lacking at present. The efficacy of newer drugs such as integrase inhibitors in this situation has not been evaluated.**

A large international trial (NICHD-HPTN 040/PACTG 1043) demonstrated that adding ARV agents to the neonatal portion of the intrapartum/neonatal zidovudine regimen can further reduce perinatal transmission of HIV for mothers who have received no antepartum ARV drugs (see [Infant Antiretroviral Prophylaxis](#)). In this study, women who had not received antepartum ARV drugs received IV zidovudine if they were identified in labor or no zidovudine when diagnosed immediately postpartum; their infants received either 6 weeks of zidovudine alone or zidovudine in combination with other agents. The combination infant regimens resulted in a 50% reduction in transmission compared with zidovudine alone.⁹ Therefore, based on the efficacy of the neonatal regimen and no benefit seen with the addition of maternal single-dose nevirapine to a regimen of maternal short-course zidovudine and infant single-dose nevirapine in the Mashi trial **by Shapiro et al in Botswana**, intrapartum maternal single-dose nevirapine is not recommended for a woman in this situation.¹⁰ **The efficacy of newer drugs such as integrase inhibitors in this situation has not been evaluated.** In the United States, where replacement feeding is affordable, feasible, acceptable, sustainable, and safe, women diagnosed with HIV infection during labor or the early postpartum period should be counseled against breastfeeding.

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