



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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Preconception Counseling and Care for HIV-Infected Women of Childbearing Age **(Last updated October 26, 2016; last reviewed October 26, 2016)**

Panel's Recommendations

- Discuss childbearing intentions with all women of childbearing age on an ongoing basis throughout the course of their care **(AIII)**.
- Provide information about effective and appropriate contraceptive methods to reduce the likelihood of unintended pregnancy **(AI)**.
- During preconception counseling, include information on safer sexual practices and elimination of alcohol, tobacco, and other drugs of abuse; if elimination is not feasible, appropriate treatment (e.g., methadone) should be provided **(AII)**.
- All HIV-infected women contemplating pregnancy should be receiving antiretroviral therapy (ART), and have a plasma viral load below the limit of detection prior to conception **(AII)**.
- When selecting or evaluating ART for HIV-infected women of childbearing age, consider a regimen's effectiveness, a woman's hepatitis B status, teratogenic potential of the drugs in the ART regimen, and possible adverse outcomes for the mother and fetus **(AII)**.
- HIV infection does not preclude the use of any contraceptive method **(AII)**. However, drug-drug interactions between hormonal contraceptives and ART should be taken into account.

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

Reproductive Options for HIV-Concordant and Serodiscordant Couples (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

For Couples Who Want to Conceive

For Concordant (Both Partners are HIV-Infected) and Discordant Couples:

- Expert consultation is recommended so that approaches can be tailored to couples' specific needs (AIII).
- Partners should be screened and treated for genital tract infections before attempting to conceive (AII).
- Both partners should attain maximum viral suppression before attempting conception (AIII).

For Discordant Couples:

- The couple should be counseled and only attempt conception after the HIV-infected partner has initiated antiretroviral therapy and have achieved sustained suppression of plasma viral load below the limits of detection (AI).
- Administration of antiretroviral pre-exposure prophylaxis 30 days before and 30 days after conception for HIV-uninfected partners may offer an additional tool to reduce the risk of sexual transmission, particularly if the HIV-infected partner's plasma viral load is unknown or detectable (BII). It is not known whether pre-exposure prophylaxis for the uninfected partner confers additional benefit when the infected partner receiving antiretroviral therapy has demonstrated sustained viral suppression.

Discordant Couples with HIV-Infected Women:

- The safest conception option is assisted insemination at home or in a provider's office with a partner's semen during the peri-ovulatory period (AIII).

Discordant Couples with HIV-Infected Men:

- The use of donor sperm from an HIV-uninfected man with artificial insemination is the safest option (AIII).
- When the use of donor sperm is unacceptable, the use of semen preparation techniques coupled with either intrauterine insemination or *in vitro* fertilization should be considered (BII).
- Semen analysis is recommended for HIV-infected men before conception is attempted to prevent unnecessary exposure to infectious genital fluid. Semen abnormalities appear to be more common among HIV-infected men than HIV-uninfected men (AIII).

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

Antepartum Care (Last updated October 26, 2016; last reviewed October 26, 2016)

General Principles Regarding Use of Antiretroviral Drugs during Pregnancy

Panel's Recommendations
<ul style="list-style-type: none">Initial evaluation of HIV-infected pregnant women should include assessment of HIV disease status, and recommendations regarding initiation of antiretroviral therapy (ART) or the need for any modification if currently receiving ART (AIII). The National Perinatal HIV Hotline (888-448-8765) provides free clinical consultation on all aspects of perinatal HIV care.All pregnant HIV-infected women should receive ART, initiated as early in pregnancy as possible, to prevent perinatal transmission regardless of plasma HIV RNA copy number or CD4 T lymphocyte count (AI). Maintenance of a viral load below the limit of detection throughout pregnancy and lifetime of the HIV-infected individual is recommended.Combined maternal antepartum and intrapartum (ARV) treatment/prophylaxis as well as infant ARV prophylaxis is recommended because ARV drugs reduce perinatal transmission by several mechanisms, including lowering maternal antepartum viral load and providing infant pre- and post-exposure prophylaxis (AI).The known benefits and potential risks of all medication use, including ARV drug use during pregnancy, should be discussed with all HIV-infected women (AIII).The importance of adherence to ARV drug regimens should be emphasized in patient counseling (AII).ARV drug-resistance studies should be performed before starting or modifying ARV drug regimens in women whose HIV RNA levels are above the threshold for resistance testing (i.e., >500 to 1,000 copies/mL) (see Antiretroviral Drug Resistance and Resistance Testing in Pregnancy) (AIII). In pregnant women not already receiving ART, ART should be initiated before results of drug-resistance testing are available because earlier viral suppression has been associated with lower risk of transmission. If ART is initiated before results are available, the regimen should be modified, if necessary, based on resistance assay results (BIII).Coordination of services among prenatal care providers, primary care and HIV specialty care providers, and when appropriate, mental health and drug abuse treatment services, intimate partner violence support services, and public assistance programs, is essential to help ensure that infected women adhere to their ARV drug regimens (AII).Providers should also initiate counseling during pregnancy about key intrapartum and postpartum considerations, including mode of delivery, maternal lifelong HIV therapy, postpartum contraception, infant feeding, infant ARV prophylaxis and timing of infant diagnostic testing and neonatal circumcision (AIII).
<p>Rating of Recommendations: A = Strong; B = Moderate; C = Optional</p> <p>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</p>

Teratogenicity (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations
<ul style="list-style-type: none">All cases of antiretroviral (ARV) drug exposure during pregnancy should be reported to the Antiretroviral Pregnancy Registry (see http://www.APREgistry.com) (AIII).Based on the preponderance of studies indicating no difference in rates of birth defects for first-trimester compared with later ARV exposures, women can be counseled that antiretroviral therapy during pregnancy generally does not increase the risk of birth defects. (BIII).
<p>Rating of Recommendations: A = Strong; B = Moderate; C = Optional</p> <p>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</p>

Combination Antiretroviral Drug Regimens and Pregnancy Outcome

(Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- Clinicians should be aware of a possible small increased risk of preterm birth in pregnant women receiving antiretroviral therapy. However, given the clear benefits of such regimens for both a woman's health and the prevention of perinatal transmission, HIV treatment should not be withheld for fear of altering pregnancy outcome (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

Recommendations for Use of Antiretroviral Drugs during Pregnancy: Overview (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- Multiple factors must be considered when choosing an antiretroviral (ARV) drug regimen for a pregnant woman, including comorbidities, convenience, adverse effects, drug interactions, resistance testing results, pharmacokinetics (PK), and experience with use in pregnancy (AIII).
- In general, the same regimens as recommended for treatment of non-pregnant adults should be used in pregnant women if appropriate drug exposure is achieved in pregnancy, unless there are known adverse effects for women, fetuses, or infants that outweigh benefits (AII).
- In most cases, women who present for obstetric care on fully suppressive ARV regimens should continue their current regimens (AIII).
- PK changes in pregnancy may lead to lower plasma levels of drugs and necessitate increased dosages, more frequent dosing, or boosting, especially of protease inhibitors (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

Pregnant Women Living with HIV Who Have Never Received Antiretroviral Drugs (Antiretroviral Naive) (Last updated December 15, 2016; last reviewed December 15, 2016)

Panel's Recommendations

- Combination antiretroviral therapy (ART) **should be recommended to all pregnant women** living with HIV to reduce the risk of perinatal transmission of HIV **and also to optimize the health of the mother (AI)**. Initiation of ART as soon as HIV is diagnosed during pregnancy is recommended based on data demonstrating that earlier virologic suppression is associated with lower risk of transmission **(AII)**.
- Antiretroviral (ARV) drug-resistance studies should be performed to guide selection of regimens in women whose HIV RNA levels are above the threshold for resistance testing (i.e., >500 to 1,000 copies/mL) unless drug-resistance studies have already been performed (see [Antiretroviral Drug Resistance and Resistance Testing in Pregnancy](#)) **(AI)**. If ART is initiated before the results of the drug-resistance assays are available, the ARV regimen should be modified, if necessary, based on the resistance assay results **(BIII)**.
- The choice of regimen should take into account current adult treatment guidelines, what is known about the use of specific drugs in pregnancy and risk of teratogenicity ([Table 6](#) and [Table 8](#)) and maternal factors such as nausea and vomiting and comorbid conditions. ART regimens that are preferred for the treatment of pregnant women living with HIV who are ARV-naive include: a dual nucleoside reverse transcriptase inhibitor combination (abacavir/lamivudine or tenofovir disoproxil fumarate/emtricitabine or lamivudine) and either a ritonavir-boosted protease inhibitor (atazanavir/ritonavir or darunavir/ritonavir) or an integrase inhibitor (raltegravir) (see [Table 6](#)) **(AIII)**.

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

HIV-Infected Pregnant Women Who Are Currently Receiving Antiretroviral Therapy (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- In general, HIV-infected pregnant women receiving antiretroviral therapy (ART) who present for care during the first trimester should continue treatment during pregnancy, assuming the regimen is tolerated and effective in suppressing viral replication (HIV-1 viral load less than lower limits of detection of the assay) **(AII)**.
- HIV antiretroviral (ARV) drug-resistance testing should be performed to assist in the selection of active drugs when changing ARV regimens in pregnant women on therapy with virologic failure and HIV RNA levels >1,000 copies/mL **(AI)**. In individuals with HIV RNA levels >500 but <1,000 copies/mL, testing may be unsuccessful but should still be considered **(BII)** (see [Lack of Viral Suppression](#)).

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

HIV-Infected Pregnant Women Who Have Previously Received Antiretroviral Treatment or Prophylaxis but Are Not Currently Receiving Any Antiretroviral Medications (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- Obtain an accurate history of all prior antiretroviral (ARV) regimens used for treatment of HIV disease or prevention of transmission, including virologic efficacy, tolerance to the medications, results of prior resistance testing, and problems with adherence (AIII).
- Choose and initiate a combination antiretroviral therapy (ART) regimen based on results of prior resistance testing, if available, prior history of ART, and current ART in pregnancy guidelines, avoiding drugs with potential known adverse effects for the mother or fetus/infant (AII).
- If HIV RNA is above the threshold for resistance testing (i.e., >500–1,000 copies/mL), ARV drug-resistance studies should be performed prior to starting an ARV drug regimen (see [Antiretroviral Drug Resistance and Resistance Testing in Pregnancy](#)) (AI).
- In general, ART should be initiated prior to receiving results of current ARV drug-resistance studies (BIII). ART should be modified based on the results of the resistance assay, if necessary (AIII).
- If the ART regimen results in insufficient viral suppression, repeat resistance testing and assess other considerations including adherence and drug interactions (BIII).
- Consider consulting with an HIV treatment specialist about the choice of ART regimen to initiate in women who previously received ARV drugs or to modify ART in those who are not fully suppressed (BIII).

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

Panel's Recommendations

- Plasma HIV RNA levels should be monitored at the initial visit (**AI**); 2 to 4 weeks after initiating (or changing) antiretroviral (ARV) drug regimens (**BI**); monthly until RNA levels are undetectable (**BIII**); and then at least every 3 months during pregnancy (**BIII**). HIV RNA levels also should be assessed at approximately 34 to 36 weeks' gestation to inform decisions about mode of delivery (see [Transmission and Mode of Delivery](#)) and to inform decisions about optimal treatment of the newborn (see [Infant ARV Prophylaxis](#)) (**AIII**).
- CD4 T lymphocyte (CD4) cell count should be monitored at the initial antenatal visit (**AI**) and every 3 to 6 months during pregnancy (**BIII**). Monitoring of CD4 cell count can be performed every 6 months in patients on combination antiretroviral therapy (ART) with consistently suppressed viral load who have CD4 counts well above the threshold for opportunistic infection risk (**CIII**).
- HIV drug-resistance studies should be performed before starting ARV regimens in all ARV-naive pregnant women whose HIV RNA levels are above the threshold for resistance testing (i.e., >500 to 1,000 copies/mL) unless they have already been tested for ARV resistance (**AIII**). HIV drug-resistance studies should be performed before modifying ARV regimens for those entering pregnancy with detectable HIV RNA levels that are above the threshold for resistance testing (i.e., >500 to 1,000 copies/mL) while receiving ARV drugs or who have suboptimal virologic response to ARV drugs started during pregnancy (**AII**). If ART is initiated before the results of the drug-resistance assays are available, the ARV regimen should be modified, if necessary, based on the resistance assay results (**BIII**).
- Monitoring for complications of ARV drugs during pregnancy should be based on what is known about the adverse effects of the drugs a woman is receiving (**AIII**).
- HIV-infected women taking ART during pregnancy should undergo standard glucose screening at 24 to 28 weeks' gestation (**AIII**). Some experts would perform earlier glucose screening in women receiving ongoing protease inhibitor (PI)-based regimens initiated before pregnancy, similar to recommendations for women with risk factors for glucose intolerance (**BIII**). For further information on PIs see [Combination Antiretroviral Drug Regimens and Pregnancy Outcome](#).
- **Ultrasound in the first trimester, or as soon as possible thereafter**, is recommended to confirm gestational age and, if scheduled cesarean delivery is necessary, to guide timing of the procedure (see [Transmission and Mode of Delivery](#)) (**AII**).
- In women on effective antiretroviral therapy (ART), no perinatal transmissions have been reported after amniocentesis, but a small risk of transmission cannot be ruled out. Amniocentesis should be performed on HIV-infected women only after initiation of an effective ART regimen and, ideally, when HIV RNA levels are undetectable (**BIII**). In women with detectable HIV RNA levels in whom amniocentesis is deemed necessary, consultation with an expert should be considered (**BIII**).

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

Antiretroviral Drug Resistance and Resistance Testing in Pregnancy (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- HIV drug-resistance studies should be performed before starting antiretroviral (ARV) regimens in all ARV-naive pregnant women whose HIV RNA levels are above the threshold for resistance testing (i.e., >500 to 1,000 copies/mL) unless they have already been tested for ARV resistance (AIII).
- Antiretroviral therapy (ART) should be initiated in pregnant women prior to receiving results of ARV-resistance studies. ART should be modified, if necessary, based on the results of the resistance assay (BIII).
- HIV drug-resistance studies should be performed before modifying ART regimens for those entering pregnancy with detectable HIV RNA levels that are above the threshold for resistance testing (i.e., >500 to 1,000 copies/mL) while receiving ARV drugs or who have suboptimal virologic response to ARV drugs started during pregnancy (AII).
- Documented zidovudine resistance does not affect the indications for use of intrapartum zidovudine (BIII).
- The optimal prophylactic regimen for newborns of women with ARV resistance is unknown. Therefore, ARV prophylaxis for an infant born to a woman with known or suspected drug resistance should be determined in consultation with a pediatric HIV specialist, preferably before delivery (see [Infant Antiretroviral Prophylaxis](#)) (AIII).
- HIV-infected pregnant women should be given ART to maximally suppress viral replication, which is the most effective strategy for preventing development of resistance and minimizing risk of perinatal transmission (AII).
- All pregnant and postpartum women should be counseled about the importance of adherence to prescribed ARV medications to reduce the potential for development of resistance (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

Lack of Viral Suppression (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- Because maternal antenatal viral load correlates with risk of perinatal transmission of HIV, suppression of HIV RNA to undetectable levels should be achieved as rapidly as possible (AII).
- If an ultrasensitive HIV RNA assay indicates failure of viral suppression (after an adequate period of treatment):
 - Assess adherence and resistance (if HIV RNA level is high enough for resistance testing) (AII).
 - Consult an HIV treatment expert and consider possible antiretroviral regimen modification (AIII).
- Scheduled cesarean delivery is recommended for HIV-infected pregnant women who have HIV RNA levels >1,000 copies/mL near the time of delivery (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

Stopping Antiretroviral Drugs during Pregnancy (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- If an antiretroviral (ARV) drug regimen must be stopped during pregnancy (e.g., for severe toxicity), all ARV drugs should be stopped simultaneously and antiretroviral therapy should be reinitiated as soon as possible (AIII).

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

HIV/Hepatitis B Virus Coinfection (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- All HIV-infected pregnant women should be screened during the current pregnancy for hepatitis B virus (HBV) and hepatitis C virus, unless they are known to be coinfecting (see [HIV/Hepatitis C Virus Coinfection](#)) (AIII).
- All HIV-infected pregnant women who screen negative for HBV (i.e., HBV surface antigen-negative, HBV core antibody-negative, and HBV surface antibody-negative) should receive the HBV vaccine series (AII).
- Women with chronic HBV infection who have not already received the hepatitis A virus (HAV) vaccine series should be screened for immunity to HAV because they are at increased risk of complications from coinfection with other viral hepatitis infections (AIII). Women with chronic HBV infection who are hepatitis A immunoglobulin G antibody-negative should receive the HAV vaccine series if they have never received it (AII).
- All pregnant and postpartum women with HIV/HBV coinfection should receive antiretroviral therapy (ART). Antepartum ART in HIV/HBV-coinfecting pregnant women should include tenofovir disoproxil fumarate plus lamivudine or emtricitabine (AI).
- Pregnant women with HIV/HBV coinfection receiving antiretroviral (ARV) drugs should be counseled about signs and symptoms of liver toxicity, and liver transaminases should be assessed 1 month following initiation of ARV drugs and at least every 3 months thereafter during pregnancy (BIII).
- Women with chronic HBV should be counseled on the importance of continuing anti-HBV medications indefinitely, both during and after pregnancy. If ARV drugs that include anti-HBV activity are discontinued in women with HIV/HBV coinfection, frequent monitoring of liver function tests for potential exacerbation of HBV infection is recommended, with prompt re-initiation of treatment for both HIV and HBV if a flare is suspected (BIII).
- Decisions concerning mode of delivery in HIV/HBV-coinfecting pregnant women should be based on standard obstetric and HIV-related indications alone; HBV coinfection does not necessitate cesarean delivery, if not otherwise indicated (see [Intrapartum Care](#)) (AIII).
- Within 12 hours of birth, infants born to women with HBV infection should receive hepatitis B immune globulin and the first dose of the HBV vaccine series (AI).

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

Panel's Recommendations

- All HIV-infected pregnant women should be screened during the current pregnancy for hepatitis B virus (HBV) and hepatitis C virus (HCV), unless they are known to be coinfecting (see [HIV/Hepatitis B Virus Coinfection](#) section) (**AIII**).
- All HIV-infected pregnant women who screen negative for HBV (i.e., HBV surface antigen-negative, HBV core antibody-negative, and HBV surface antibody-negative) should receive the HBV vaccine series (**AII**).
- Women with chronic HBV or HCV infection should also be screened for hepatitis A virus (HAV) because they are at increased risk of complications from coinfection with other viral hepatitis infections (**AIII**). Women with chronic HCV who are negative for hepatitis A immunoglobulin G should receive the HAV vaccine series if they have never received it (**AII**).
- The management of HIV/HCV coinfection in pregnancy is complex because none of the approved HCV oral medications **have been evaluated** in pregnant women, **and the use of ribavirin is contraindicated in pregnancy** (**AIII**). If considering treatment of HCV in an HIV-coinfecting pregnant woman, consultation with an expert in HIV and HCV is strongly recommended (**AIII**).
- Recommendations for antiretroviral (ARV) drug use during pregnancy are the same for HIV-infected women whether or not they have chronic HCV (**BIII**).
- Pregnant women with HIV/HCV coinfection receiving ARV drugs should be counseled about signs and symptoms of liver toxicity, and liver transaminases should be assessed 1 month following initiation of ARV drugs and at least every 3 months thereafter during pregnancy (**BIII**).
- Decisions concerning mode of delivery in HIV/HCV-coinfecting pregnant women should be based on standard obstetric and HIV-related indications alone; HCV coinfection does not necessitate cesarean delivery, if not otherwise indicated (see [Intrapartum Care](#)) (**AIII**).
- Infants born to women with HIV/HCV coinfection should be evaluated for HCV infection with anti-HCV antibody testing after age 18 months (**AII**). Infants who screen positive should undergo confirmatory HCV RNA testing. If earlier diagnosis is desired, HCV RNA virologic testing can be done after age 2 months (**AIII**).

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

HIV-2 Infection and Pregnancy (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- HIV-2 infection should be considered in pregnant women who are from—or have partners from—countries in which the disease is endemic and who have positive results on an HIV-1/HIV-2 antibody or HIV-1/HIV-2 antigen/antibody immunoassay. They should be tested with a supplemental HIV-1/HIV-2 antibody differentiation assay. If they are indeed HIV-2 infected it would show negative HIV-1 antibodies and positive HIV-2 antibodies (**AII**).
- Pregnant women with HIV-1 and HIV-2 coinfection should be treated as per guidelines for HIV-1 mono-infection, but using antiretroviral drugs to which HIV-2 is sensitive (see below).
- No randomized clinical trials have been performed to address when to start treatment or what the optimal treatment is for HIV-2 mono-infection.
- Optimal prophylactic regimens have not been defined for HIV-2-**mono**infected pregnant women. A regimen with two nucleoside reverse transcriptase inhibitors and a boosted protease inhibitor **or integrase strand transfer inhibitor** is recommended for **all** HIV-2-infected pregnant women (**AIII**).
- Non-nucleoside reverse transcriptase inhibitors and enfuvirtide are not active against HIV-2 and should not be used (**AIII**).
- All infants born to HIV-2-infected mothers should receive the standard 6-week zidovudine prophylactic regimen (**BIII**).
- In the United States, where safe infant formula is readily available, breastfeeding is not recommended for infants of HIV-2-infected mothers (**AIII**).

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

The Management of Prenatal Care and General Principles of Antiretroviral Therapy and HIV Management in Women Who Were Infected Perinatally (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- The management of prenatal care and general principles of antiretroviral therapy (ART) and HIV management do not differ between pregnant women who were infected perinatally and those who acquired HIV infection postnatally. With appropriate ART and prenatal management (and when optimal viral suppression is attained) the risk of perinatal transmission does not appear to be increased in women who acquired HIV perinatally (**AII**).
- Using the same guiding principles that are used for heavily ART-experienced adults, optimal ART regimens should be selected on the basis of resistance testing, prior ART history, and pill burden (**AII**).
- The presence of extensive drug resistance may warrant the use of ARV drugs for which there is limited experience in pregnancy. Consultation with experts in HIV and pregnancy is recommended (**AIII**).

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

Acute HIV Infection (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- When acute retroviral syndrome is suspected in pregnancy or during breastfeeding, a plasma HIV RNA test should be obtained in conjunction with a routine HIV antibody screening test or an antigen/antibody immunoassay test (see [Acute and Recent \(Early\) HIV Infection](#) in the [Adult and Adolescent Antiretroviral Guidelines](#) and <http://www.cdc.gov/hiv/pdf/HIVtestingAlgorithmRecommendation-Final.pdf>) (AII).
- Repeat HIV testing in the third trimester is recommended for pregnant women with initial negative HIV antibody tests who are known to be at risk of acquiring HIV, who are receiving care in facilities that have an HIV incidence in pregnant women of at least 1 per 1,000 per year, who are incarcerated, or who reside in jurisdictions with elevated HIV incidence (see [Revised Recommendations for HIV Testing of Adults, Adolescents, and Pregnant Women in Health-Care Settings](#) and <http://www.cdc.gov/hiv/pdf/HIVtestingAlgorithmRecommendation-Final.pdf>) (AII).
- All pregnant women with acute or recent HIV infection should start an antiretroviral therapy as soon as possible to prevent perinatal transmission, with the goal of suppressing plasma HIV RNA to below detectable levels (AI).
- In women with acute HIV infection, baseline genotypic resistance testing should be performed simultaneously with initiation of antiretroviral therapy, and the regimen should be adjusted, if necessary, to optimize virologic response (AIII). A ritonavir-boosted-protease-inhibitor-based regimen with tenofovir disoproxil fumarate/emtricitabine should be initiated (AIII).

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

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Intrapartum Care (Last updated October 26, 2016; last reviewed October 26, 2016)

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

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Transmission and Mode of Delivery (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- Scheduled cesarean delivery at 38 weeks' gestation to minimize perinatal transmission of HIV is recommended for women with HIV RNA levels >1,000 copies/mL or unknown HIV levels near the time of delivery, irrespective of administration of antepartum antiretroviral therapy (ART) (**AII**). Scheduled cesarean delivery performed solely for prevention of perinatal transmission in women receiving ART with HIV RNA ≤1,000 copies/mL is not routinely recommended due to the low rate of perinatal transmission in this group (**AII**). In women with HIV RNA levels ≤1000 copies/mL, **if scheduled cesarean delivery or induction is indicated, it should be performed at the standard time** for obstetrical indications.
- In women with an HIV RNA >1,000 copies/mL or unknown HIV RNA level who present in spontaneous labor or with ruptured membranes, there is insufficient evidence to determine whether cesarean reduces the risk of perinatal HIV transmission. Management of women originally scheduled for cesarean delivery **because of HIV infection** who present in labor must be individualized at the time of presentation (**BII**). In these circumstances, consultation with an expert in perinatal HIV (e.g., telephone consultation with the National Perinatal HIV/AIDS Clinical Consultation Center at (888) 448-8765) may be helpful in rapidly developing an individualized delivery plan.
- In women on ART with HIV RNA ≤1,000 copies/ml, duration of ruptured membranes is not associated with an increased risk of perinatal transmission, and vaginal delivery is recommended (**BII**).

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

Other Intrapartum Management Considerations (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- Artificial rupture of membranes (ROM) performed in the setting of antiretroviral therapy and virologic suppression is not associated with increased risk of perinatal transmission and can be performed for standard obstetric indications (**BII**)
- The following should generally be avoided because of a potential increased risk of transmission, unless there are clear obstetric indications:
 - Artificial ROM **in the setting of viremia** (**BIII**)
 - Routine use of fetal scalp electrodes for fetal monitoring (**BIII**)
 - Operative delivery with forceps or a vacuum extractor (**BIII**)
 - **Episiotomy** (**BIII**)
- The ART regimen a woman is receiving should be taken into consideration when treating excessive postpartum bleeding resulting from uterine atony:
 - In women who are receiving a cytochrome P (CYP) 450 3A4 enzyme inhibitor (e.g., a protease inhibitor), methergine should be used only if no alternative treatments for postpartum hemorrhage are available and the need for pharmacologic treatment outweighs the risks. If methergine is used, it should be administered in the lowest effective dose for the shortest possible duration (**BIII**).
 - In women who are receiving a CYP3A4 enzyme inducer such as nevirapine, efavirenz, or etravirine, additional uterotonic agents may be needed because of the potential for decreased methergine levels and inadequate treatment effect (**BIII**).

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

Postpartum Care (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- Antiretroviral therapy (ART) is currently recommended for all HIV-infected individuals to reduce the risk of disease progression and to prevent HIV sexual transmission (**AI**). Decisions regarding continuing or modifying ART after delivery should be made in consultation with the woman and her HIV care provider, ideally before delivery, taking into consideration the preferred regimens for non-pregnant adults versus those for pregnant adults (**AIII**).
- Because the immediate postpartum period poses unique challenges to antiretroviral adherence, arrangements for new or continued supportive services should be made before hospital discharge (**AII**).
- Contraceptive counseling is a critical aspect of postpartum care (**AIII**).
- Women with a positive expedited HIV antibody test during labor should receive intravenous (IV) zidovudine immediately (see [Intrapartum Care: Women Who Present in Labor without Documentation of HIV Status](#)) and should not breastfeed unless a confirmatory HIV test is negative.
- Women with a positive rapid HIV antibody test during labor require immediate linkage to HIV care and comprehensive follow-up, including confirmation of HIV infection. If infection is confirmed, a full health assessment is warranted, including evaluation for associated medical conditions, counseling related to newly diagnosed HIV infection, continued ART, and assessment of the need for opportunistic infection prophylaxis (**AII**).
- Breastfeeding is not recommended for HIV-infected women in the United States (**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

Infant Antiretroviral Prophylaxis (Last Updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- All HIV-exposed infants should receive postpartum antiretroviral (ARV) drugs to reduce the risk of perinatal transmission of HIV **(AI)**.
- Infant ARV prophylaxis—at gestational age-appropriate doses—should be initiated as close to the time of birth as possible, preferably within 6 to 12 hours of delivery **(AII)**.
- A 4-week neonatal zidovudine prophylaxis regimen can be used for full-term infants when the mother has received a standard antiretroviral therapy regimen (ART) during pregnancy with sustained viral suppression and there are no concerns related to maternal adherence **(BII)**. **Otherwise, a 6-week course as part of a combination infant prophylaxis regimen is recommended (AI).**
- A combination infant prophylaxis regimen is recommended in infants at higher risk of HIV acquisition, including those born to HIV-infected women who:
 - Have not received antepartum or intrapartum ARV drugs **(AI)**, or
 - Have received only intrapartum ARV drugs **(AI)**, or
 - Have received antepartum ARV drugs but do not have viral suppression near delivery **(BIII)**.
- For infants born to mothers with unknown HIV status, expedited HIV testing of mothers and/or infants is recommended as soon as possible, either during labor or after birth, with immediate initiation of infant ARV prophylaxis if the initial expedited test is positive **(AII)**. If supplemental testing is negative, ARV prophylaxis can be discontinued.
- In the United States, the use of ARV drugs other than zidovudine and nevirapine cannot be recommended in premature infants as prophylaxis to prevent transmission because of lack of dosing and safety data **(BIII)**.
- The National Perinatal HIV Hotline (1-888-448-8765) provides free clinical consultation on all aspects of perinatal HIV, including infant care.

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

Initial Postnatal Management of the HIV-Exposed Neonate (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendations

- A complete blood count and differential should be performed on newborns as a baseline evaluation (BIII).
- If hematologic abnormalities are identified in infants receiving prophylaxis, decisions on whether to continue infant antiretroviral (ARV) prophylaxis need to be individualized. Consultation with an expert in pediatric HIV infection is advised if early discontinuation of prophylaxis is considered (CIII).
- Decisions about the timing of subsequent monitoring of hematologic parameters in infants depend on baseline hematologic values, gestational age at birth, clinical condition of the infants, the zidovudine dose being administered, receipt of other ARV drugs and concomitant medications, and maternal antepartum therapy (CIII).
- Hemoglobin and neutrophil counts should be remeasured 4 weeks after initiation of prophylaxis for infants who receive combination zidovudine/lamivudine-containing ARV prophylaxis regimens (AI).
- Routine measurement of serum lactate is not recommended. However, measurement can be considered if an infant develops severe clinical symptoms of unknown etiology (particularly neurologic symptoms) (CIII).
- Virologic tests are required to diagnose HIV infection in infants aged <18 months and should be performed at 14 to 21 days of life and at ages 1 to 2 months and 4 to 6 months (AII).
- To prevent *Pneumocystis jirovecii* pneumonia (PCP), all infants born to HIV-infected women should begin PCP prophylaxis at ages 4 to 6 weeks, after completing their ARV prophylaxis regimen, unless there is adequate test information to presumptively exclude HIV infection (see the [Pediatric Opportunistic Infections Guidelines](#)) (AII).
- Health care providers should routinely inquire about breastfeeding and premastication; instruct HIV-infected caregivers to avoid these practices, and advise on safer feeding options (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

Long-Term Follow-Up of Antiretroviral Drug-Exposed Infants (Last updated October 26, 2016; last reviewed October 26, 2016)

Panel's Recommendation

- Children with *in utero*/neonatal exposure to antiretroviral drugs who develop significant organ system abnormalities of unknown etiology, particularly of the nervous system or heart, should be evaluated for potential mitochondrial dysfunction (CIII).

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