Early (Acute and Recent) HIV Infection

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Panel's Recommendations
• When early[a] (acute and recent) HIV infection is suspected during pregnancy, the postpartum period, or breastfeeding, a plasma HIV RNA test should be obtained in conjunction with an antigen/antibody immunoassay test (AII). See Early (Acute and Recent) HIV Infection in the Adult and Adolescent Antiretroviral Guidelines and the Centers for Disease Control and Prevention (CDC) HIV testing algorithm for more information.
• Repeat HIV testing in the third trimester is recommended for pregnant people with initial negative HIV test results who are at increased risk of acquiring HIV, including those receiving care in facilities that have an HIV incidence of ≥1 case per 1,000 pregnant women per year, those who reside in jurisdictions (states or counties) with elevated HIV incidence among females aged 15 to 45 years (>17 per 100,000 females aged 15–45 years), or those who reside in states or territories that require third-trimester testing (see Pregnancy and Postpartum HIV Testing and Identification of Perinatal and Postnatal HIV Exposure) (AII). Annual state- and county-level HIV incidence among females is available at CDC's National Center for HIV, Viral Hepatitis, STD, and TB Prevention AtlasPlus webpage.
• All pregnant and breastfeeding people with early HIV infection should start antiretroviral therapy (ART) as soon as possible for their own health and to reduce the risk of perinatal and horizontal HIV transmission, with the goal of rapidly suppressing plasma HIV RNA below detectable levels (AI).
• In people with early HIV infection, baseline genotypic resistance testing should be performed simultaneously with initiation of ART, and the regimen should be adjusted, if necessary, to optimize virologic response (AII).
• One of the following regimens is recommended for pregnant people with early infection without a history of prior use of long-acting cabotegravir (CAB-LA) as pre-exposure prophylaxis (PrEP): o Dolutegravir (DTG) plus tenofovir disoproxil fumarate (TDF) or tenofovir alafenamide (TAF) with emtricitabine (FTC) or lamivudine (3TC) is the *Preferred* ART irrespective of trimester (AII). o Bictegravir (BIC) plus TAF plus FTC is an *Alternative* ART regimen (AII). o Ritonavir-boosted darunavir (DRV/r) plus (TDF or TAF) with (FTC or 3TC) is an *Alternative* ART regimen (AIII). o See Table 6. What to Start: Initial Antiretroviral Regimens During Pregnancy for People Who Are Antiretroviral-Naive, Table 7. Situation-Specific Recommendations for Use of Antiretroviral Drugs in Pregnant People and Nonpregnant People Who Are Trying to Conceive, Recommendations for Use of Antiretroviral Drugs During Pregnancy, Appendix C: Antiretroviral Counseling Guide for Health Care Providers, and Early (Acute and Recent) HIV Infection in the Adult and Adolescent Antiretroviral Guidelines for more information.
• For pregnant people with early infection with a history of prior use of CAB-LA as PrEP, genotype testing done before the start of ART should include screening for integrase strand transfer inhibitor–resistance mutations. o A regimen of DRV/r with (TDF or TAF) plus (FTC or 3TC) is the *Preferred* ART regimen pending results of genotype testing (AIII). See Early (Acute and Recent) HIV Infection in the Adult and Adolescent Antiretroviral Guidelines for more information.
• One of the following regimens is recommended for people diagnosed with early HIV infection during the postpartum period: BIC/TAF/FTC; DTG with (TAF or TDF) plus (FTC or 3TC); or DRV/r with (TAF or TDF) plus (FTC or 3TC) (AIII). See Early (Acute and Recent) HIV Infection in the Adult and Adolescent Antiretroviral Guidelines for more information.
• The Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission emphasizes the importance of counseling and informed decision-making regarding all antiretroviral (ARV) regimens for people with HIV (AIII).
• Providers should inform individuals starting ART of the importance of strict adherence to rapidly achieve and maintain viral suppression (AIII).

• People who receive a diagnosis of HIV infection when they are breastfeeding should be counseled to discontinue breastfeeding immediately to reduce the risk of postnatal HIV transmission to the infant (AII). • Infants born to people who received a diagnosis of early HIV infection during pregnancy or breastfeeding are at high risk of acquiring HIV infection and should receive presumptive HIV therapy (see Table 10. Neonatal Antiretroviral Management According to Risk of HIV Infection in the Newborn and Table 12. Antiretroviral Management of Infants with Exposure to HIV During Breastfeeding in Antiretroviral Management of Newborns with Perinatal HIV Exposure or HIV Infection) (AII). Consulting a pediatric HIV specialist regarding appropriate infant management is strongly recommended.
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*

[a] Early HIV infection represents either acute or recent HIV infection.

Women may have an increased risk of HIV infection during pregnancy or breastfeeding.[1-3] People who are at risk for acquiring HIV during pregnancy and the postpartum period should consider using interventions that prevent HIV acquisition, such as oral daily or long-acting injectable antiretroviral (ARV) formulations for pre-exposure prophylaxis (PrEP).[4] For more information, see Pre-exposure Prophylaxis (PrEP) to Prevent HIV During Periconception, Antepartum, and Postpartum Periods.

Risk of Perinatal Transmission After Early HIV Infection in the Birthing Parent

Early HIV infection is a term that encompasses acute or recent infection. During pregnancy or breastfeeding, early infection is associated with an increased risk of perinatal HIV transmission, and a significant proportion of pediatric infections can be attributed to maternal acute infection.[5] Among 10,308 pregnant women with HIV who delivered live infants from 2005 to 2010 in 15 areas of the United States that conducted enhanced perinatal surveillance, 124 women (1.2%) seroconverted during pregnancy. The rate of perinatal transmission was eight times higher among women who seroconverted during pregnancy (12.9%) than among those who seroconverted before pregnancy (1.6%) ($P < 0.0001$).[6] Similarly, among 108 new perinatal HIV infections that were identified between 2006 and 2013 in the United Kingdom, 23 (21.3%) were associated with a concurrent maternal seroconversion.[7] The high rate of transmission in people with acute infection likely is related to the high viral loads in plasma, breast milk, and the genital tract that are present during acute infection.[8] Acute HIV infection can be asymptomatic or symptoms can be nonspecific, which results in missed opportunities to diagnose and implement interventions that can reduce the risk of perinatal transmission.

Diagnosis of Early (Acute or Recent) HIV Infection During Pregnancy, Postpartum, or Breastfeeding

Acute HIV infection occurs immediately after acquisition and is typically characterized by high viremia detected by the presence of HIV RNA or p24 antigen. Anti-HIV antibodies are not detectable early during this phase of HIV infection (see Early [Acute and Recent] HIV Infection section of the Adult and Adolescent Antiretroviral Guideline). Recent HIV infection generally is considered the phase of HIV disease ≤6 months after infection, during which anti-HIV antibodies develop and become detectable.[9-14] Health care providers should maintain a high level of awareness of possible HIV infection in patients who are pregnant or breastfeeding and have clinical signs and symptoms that are compatible with acute infection. Even when patients do not report high-risk behaviors, it is

still possible that their sexual partners are practicing high-risk behaviors without their knowledge or that they do not recognize that such behaviors put them at risk for HIV acquisition. An estimated 40% to 90% of patients with acute HIV infection will experience symptoms of acute retroviral syndrome, which is characterized by fever, lymphadenopathy, pharyngitis, skin rash, myalgias/arthralgias, headache, diarrhea, oral ulcers, and other symptoms.[15-19] Providers often do not recognize acute HIV infection because the symptoms are similar to those of other common illnesses, and some individuals with acute HIV infection may be asymptomatic.

When early HIV infection is suspected during pregnancy or breastfeeding, a quantitative or qualitative plasma HIV RNA test should be obtained in conjunction with an antigen/antibody immunoassay test. Guidance for HIV testing recommends using a U.S. Food and Drug Administration–approved antigen/antibody combination (fourth-generation) immunoassay that detects HIV-1 and HIV-2 antibodies and HIV-1 p24 antigen for initial testing. These tests are used to screen for established infection with HIV-1 or HIV-2 and for early HIV-1 infection. More specific guidance on HIV testing can be found in the Early (Acute and Recent) HIV Infection section of the Adult and Adolescent Antiretroviral Guidelines, the Centers for Disease Control and Prevention (CDC) HIV testing algorithm, and the Maternal HIV Testing and Identification of Perinatal HIV Exposure section. People who acquire HIV while taking PrEP may sometimes have ambiguous HIV test results that may require additional testing. See Early (Acute and Recent) HIV Infection in the Adult and Adolescent Antiretroviral Guidelines and Pre-exposure Prophylaxis (PrEP) to Prevent HIV During Periconception, Antepartum, and Postpartum Periods for more information on diagnosing acute HIV infection in people taking PrEP.

Repeat HIV testing in the third trimester is recommended for pregnant people who are at increased risk of acquiring HIV, including those receiving care in facilities that have an HIV incidence of ≥1 case per 1,000 pregnant persons per year, those who reside in jurisdictions (states or counties) with elevated HIV incidence among females aged 15 to 45 years (>17 per 100,000 females aged 15–45 years), and those who reside in states or territories that require third-trimester testing.[20,21] Annual state- and county-level HIV incidence among females is available at CDC's National Center for HIV, Viral Hepatitis, STD, and TB Prevention AtlasPlus webpage (see Prenatal and Perinatal Human Immunodeficiency Virus Testing; Revised Recommendations for HIV Testing of Adults, Adolescents, and Pregnant Women in Health-Care Settings; the CDC HIV testing algorithm; and Maternal HIV Testing and Identification of Perinatal HIV Exposure). Implementation of the recommendation for repeat HIV testing later in pregnancy has varied. A retrospective cohort study at a large metropolitan hospital in a high-prevalence jurisdiction in Maryland reported that repeat prenatal HIV testing was performed in only 28.4% of women.[22] In states with mandated late-trimester HIV testing, reported rates of retesting are substantially higher. At a large, urban tertiary hospital in Florida, 82% of women were retested in the third trimester.[23] Similarly, a single high-volume birthing center in Illinois reported an increase in repeat testing from 80% to 98% after implementing measures to comply with the state's third-trimester testing mandate.[24]

Antiretroviral Therapy for People with Acute or Recent HIV Infection During Pregnancy or the Postpartum Period

Acute or recent HIV infection during pregnancy, postpartum, or breastfeeding is associated with a high risk of vertical transmission of HIV.[1,5] Therefore, all pregnant people with acute or recent HIV infection should start antiretroviral therapy (ART) as soon as possible to rapidly achieve and sustain plasma viral suppression, for their own health and to prevent perinatal and horizontal transmission. Baseline genotypic resistance testing should be performed to guide adjustment of an optimal ARV

drug regimen. Data from the United States and Europe demonstrate that in 6% to 19% of patients, transmitted virus may be resistant to ≥1 ARV drugs.[25-27] If results of resistance testing are already available or the source virus's resistance pattern is known, that information can be used to guide the selection of the drug regimen. The Panel on Antiretroviral Guidelines for Adults and Adolescents does not currently recommend routine genotype testing for integrase strand transfer inhibitor (INSTI) resistance in treatment-naive individuals, with the exception of individuals who acquire HIV infection during or after the use of long-acting cabotegravir (CAB-LA) as PrEP (see Early [Acute and Recent] HIV Infection in the Adult and Adolescent Antiretroviral Guidelines for more information). Some panel members also recommend genotypic testing for INSTI resistance in pregnant people with early infection who have sexual partners on INSTI-based ART with unsuppressed or unknown viral loads.

In pregnant people who have not received CAB-LA prior to diagnosis of acute/recent HIV infection, a regimen that includes dolutegravir (DTG) plus tenofovir disoproxil fumarate (TDF) or tenofovir alafenamide (TAF) plus emtricitabine (FTC) or lamivudine (3TC) should be initiated (see Table 6. What to Start: Initial Antiretroviral Regimens During Pregnancy for People Who Are Antiretroviral-Naive, Table 7. Situation-Specific Recommendations for Use of Antiretroviral Drugs in Pregnant People and Nonpregnant People Who Are Trying to Conceive, Appendix C: Antiretroviral Counseling Guide for Health Care Providers, and Early [Acute and Recent] HIV Infection in the Adult and Adolescent Antiretroviral Guidelines for more information). DTG is associated with high rates of viral suppression, fast rates of viral load decline, and a high genetic barrier to drug resistance. DTG plus TDF (or TAF) plus FTC (or 3TC) is one of the recommended ARV regimens for treatment of acute and early infection in nonpregnant adults and a *Preferred* regimen for treatment during pregnancy. Bictegravir (BIC) plus TAF plus FTC is now recommended as an *Alternative* regimen for ART treatment in pregnancy and can also be considered for treatment of early infection. For pregnant people with early infection and a history of prior use of CAB-LA as PrEP, genotype testing done before the start of ART should include screening for INSTI-resistance mutations, and a regimen of ritonavir-boosted darunavir (DRV/r) (administered twice daily during pregnancy) plus (TDF or TAF) plus (FTC or 3TC) (see Table 6. What to Start: Initial Antiretroviral Regimens During Pregnancy for People Who Are Antiretroviral-Naive, and Table 7. Situation-Specific Recommendations for Use of Antiretroviral Drugs in Pregnant People and Nonpregnant People Who Are Trying to Conceive) should be initiated. The regimen can be adjusted once drug resistance results are available. In the case that the pregnant person cannot receive an INSTI-based regimen (e.g., intolerance, potential transmitted resistance), DRV/r plus (TDF or TAF) plus (FTC or 3TC) should be administered. TDF (or TAF) plus (FTC or 3TC) are *Preferred* nucleoside reverse transcriptase inhibitor (NRTI) backbones for treatment of early infection. The efficacy and toxicity of TDF and TAF in pregnant patients are similar. In the International Maternal Pediatric Adolescent AIDS Clinical Trials (IMPAACT) 2010 trial, no differences were observed in viral suppression, Grade 3 or higher adverse events, or estimated creatinine clearance among people randomized to initiate TDF/FTC (n = 215) versus TAF/FTC (n = 217) with DTG at >14 weeks gestational age.[28] Abacavir (ABC) **is not recommended** for empiric treatment of acute infection unless the patient previously tested negative for the HLA-B*5701 gene variant; using TDF or TAF rather than ABC will avoid delays in ART initiation while awaiting HLA-B*5701 test results.

Several studies have demonstrated that the use of INSTI-based regimens is associated with shorter time to viral suppression compared with other ARV regimens.[28-33] Although no data are available to inform the treatment of early HIV during pregnancy, two studies in pregnant women demonstrated more rapid viral decline on DTG-based regimens than on efavirenz (EFV)-based ART. In the DolPHIN 2 study (dolutegravir in pregnant HIV mothers and their neonates), 268 ART-naive

pregnant women in Uganda and South Africa with a median gestational age of 31 weeks were randomized to receive either DTG plus two NRTIs or EFV plus two NRTIs. At delivery, women in the DTG arm were significantly more likely to have achieved HIV RNA <50 copies/mL than those in the EFV arm (74% vs. 43%, respectively; adjusted risk ratio 1.66 [95% confidence interval, 1.3–2.1]; $P < 0.0001$).[32] In the IMPAACT 2010 trial, 643 pregnant women, 14 to 28 weeks gestation, were assigned randomly to receive DTG plus FTC and TDF, DTG plus FTC and TAF, or EFV plus FTC and TDF. At delivery, 395 (98%) of 405 participants in the combined DTG-containing groups had viral suppression (HIV-1 RNA <200 copies per mL) compared with 182 (91%) of 200 participants in the EFV plus FTC and TDF group. Furthermore, participants assigned to a DTG-containing group had a significantly shorter time to viral suppression than those in the EFV-containing group.[28]

People who are diagnosed with acute or recent HIV postpartum should start ART as soon as possible. ART options and management should follow guidance outlined in Early (Acute and Recent) HIV in the Adult and Adolescent Antiretroviral Guidelines. One of the following ART regimens is recommended: BIC/TAF/FTC; DTG with (TAF or TDF) plus (FTC or 3TC); or boosted DRV with (TAF or TDF) plus (FTC or 3TC).

Obstetrical and Neonatal Considerations

When early HIV infection is diagnosed during pregnancy, and particularly when it is documented in late pregnancy, cesarean delivery may be necessary when there is insufficient time to fully suppress a patient's viral load (see Intrapartum Care for People with HIV). Infants born to people who received a diagnosis of early HIV infection during pregnancy or breastfeeding are at high risk of acquiring HIV infection and should receive presumptive HIV therapy (see Table 10. Neonatal Antiretroviral Management According to Risk of HIV Infection in the Newborn and Table 12. Antiretroviral Management of Infants with Exposure to HIV During Breastfeeding in Antiretroviral Management of Newborns with Perinatal HIV Exposure or HIV Infection). The infant also should receive immediate diagnostic testing (see Diagnosis of HIV Infection in Infants and Children). Consulting a pediatric HIV specialist regarding appropriate infant management is strongly recommended.

When HIV infection is diagnosed during breastfeeding, breastfeeding should be discontinued immediately. In nursing people with suspected seroconversion, breastfeeding should be interrupted immediately, and it should not resume if infection is confirmed (see Situations to Consider Stopping or Modifying Breastfeeding in Infant Feeding for Individuals with HIV in the United States). Patients can continue to express and store breast milk while awaiting confirmation of infection status. Due to the high risk of postnatal transmission associated with early infection in pregnancy and during breastfeeding, this guidance is more directive than the shared decision-making recommended for individuals on suppressive ART.

All people who receive a diagnosis of infection should be asked whether they know the HIV status of their partners. HIV testing of the sexual partners of all pregnant people who test HIV positive should be encouraged, and PrEP should be offered to partners who test HIV negative.

References

1. Drake AL, Wagner A, Richardson B, John-Stewart G. Incident HIV during pregnancy and postpartum and risk of mother-to-child HIV transmission: a systematic review and meta-analysis. *PLoS Med*. 2014;11(2):e1001608. Available at: https://pubmed.ncbi.nlm.nih.gov/24586123.

2. Graybill LA, Kasaro M, Freeborn K, et al. Incident HIV among pregnant and breast-feeding women in sub-Saharan Africa: a systematic review and meta-analysis. *AIDS*. 2020;34(5):761-776. Available at: https://pubmed.ncbi.nlm.nih.gov/32167990.

3. Rees H, Chersich MF, Munthali RJ, et al. HIV incidence among pregnant and nonpregnant women in the FACTS-001 trial: implications for HIV prevention, especially PrEP use. *J Acquir Immune Defic Syndr*. 2021;88(4):376-383. Available at: https://pubmed.ncbi.nlm.nih.gov/34710071.

4. Mofenson LM. Risk of HIV acquisition during pregnancy and postpartum: a call for action. *J Infect Dis*. 2018;218(1):1-4. Available at: https://pubmed.ncbi.nlm.nih.gov/29506075.

5. Nesheim S, Harris LF, Lampe M. Elimination of perinatal HIV infection in the USA and other high-income countries: achievements and challenges. *Curr Opin HIV AIDS*. 2013;8(5):447-456. Available at: https://pubmed.ncbi.nlm.nih.gov/23925002.

6. Singh S, Lampe MA, Surendera B, et al. HIV seroconversion during pregnancy and mother-to-child HIV transmission: data from the enhanced perinatal surveillance projects, United States, 2005–2010. Presented at: Conference on Retroviruses and Opportunistic Infections. 2013. Atlanta, GA.

7. Peters H, Thorne C, Tookey PA, Byrne L. National audit of perinatal HIV infections in the UK, 2006–2013: what lessons can be learnt? *HIV Med*. 2018;19(4):280-289. Available at: https://pubmed.ncbi.nlm.nih.gov/29336508.

8. Morrison CS, Demers K, Kwok C, et al. Plasma and cervical viral loads among Ugandan and Zimbabwean women during acute and early HIV-1 infection. *AIDS*. 2010;24(4):573-582. Available at: https://pubmed.ncbi.nlm.nih.gov/20154581.

9. Daar ES, Little S, Pitt J, et al. Diagnosis of primary HIV-1 infection. Los Angeles County Primary HIV Infection Recruitment Network. *Ann Intern Med*. 2001;134(1):25-29. Available at: https://pubmed.ncbi.nlm.nih.gov/11187417.

10. Hecht FM, Busch MP, Rawal B, et al. Use of laboratory tests and clinical symptoms for identification of primary HIV infection. *AIDS*. 2002;16(8):1119-1129. Available at: https://pubmed.ncbi.nlm.nih.gov/12004270.

11. McKellar MS, Cope AB, Gay CL, et al. Acute HIV-1 infection in the southeastern United States: a cohort study. *AIDS Res Hum Retroviruses*. 2013;29(1):121-128. Available at: https://pubmed.ncbi.nlm.nih.gov/22839749.

12. Robb ML, Eller LA, Kibuuka H, et al. Prospective study of acute HIV-1 infection in adults in East Africa and Thailand. *N Engl J Med*. 2016;374(22):2120-2130. Available at: https://pubmed.ncbi.nlm.nih.gov/27192360.

13. Kuruc JD, Cope AB, Sampson LA, et al. Ten years of screening and testing for acute HIV infection in North Carolina. *J Acquir Immune Defic Syndr*. 2016;71(1):111-119. Available at: https://pubmed.ncbi.nlm.nih.gov/26761274.

14. Hoenigl M, Green N, Camacho M, et al. Signs or symptoms of acute HIV infection in a cohort undergoing community-based screening. *Emerg Infect Dis*. 2016;22(3):532-534. Available at: https://pubmed.ncbi.nlm.nih.gov/26890854.

15. Yerly S, Hirschel B. Diagnosing acute HIV infection. *Expert Rev Anti Infect Ther*. 2012;10(1):31-41. Available at: https://pubmed.ncbi.nlm.nih.gov/22149612.

16. Richey LE, Halperin J. Acute human immunodeficiency virus infection. *Am J Med Sci*. 2013;345(2):136-142. Available at: https://pubmed.ncbi.nlm.nih.gov/23095473.

17. Crowell TA, Colby DJ, Pinyakorn S, et al. Acute retroviral syndrome is associated with high viral burden, CD4 depletion, and immune activation in systemic and tissue compartments. *Clin Infect Dis*. 2018;66(10):1540-1549. Available at: https://pubmed.ncbi.nlm.nih.gov/29228130.

18. Ladzinski AT, George NB, Jagger BW. Bilateral peripheral facial paralysis during pregnancy: a presentation of acute HIV seroconversion. *BMJ Case Rep*. 2021;14(5). Available at: https://pubmed.ncbi.nlm.nih.gov/34035026.

19. Cassimatis IR, Ayala LD, Miller ES, et al. Third-trimester repeat HIV testing: it is time we make it universal. *Am J Obstet Gynecol*. 2021;225(5):494-499. Available at: https://pubmed.ncbi.nlm.nih.gov/33932342.

20. Branson BM, Handsfield HH, Lampe MA, et al. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. *MMWR Recomm Rep*. 2006;55(RR-14):1-17; quiz CE11-14. Available at: https://pubmed.ncbi.nlm.nih.gov/16988643.

21. Salvant Valentine S, Caldwell J, Tailor A. Effect of CDC 2006 revised HIV testing recommendations for adults, adolescents, pregnant women, and newborns on state laws, 2018. *Public Health Rep*. 2020;135(1_suppl):189S-196S. Available at: https://pubmed.ncbi.nlm.nih.gov/32735201.

22. Liao C, Golden WC, Anderson JR, Coleman JS. Missed opportunities for repeat HIV testing in pregnancy: implications for elimination of mother-to-child transmission in the United States. *AIDS Patient Care STDS*. 2017;31(1):20-26. Available at: https://pubmed.ncbi.nlm.nih.gov/27936863.

23. Szlachta-McGinn A, Aserlind A, Duthely L, et al. HIV screening during pregnancy in a U.S. HIV epicenter. *Infect Dis Obstet Gynecol*. 2020;2020:8196342. Available at: https://pubmed.ncbi.nlm.nih.gov/32454582.

24. Berhie SH, Tsai S, Miller ES, et al. Evaluation of state-mandated third trimester repeat HIV testing in a large tertiary care center. *Am J Perinatol*. 2022. Available at: https://pubmed.ncbi.nlm.nih.gov/35973790.

25. Rhee SY, Blanco JL, Jordan MR, et al. Geographic and temporal trends in the molecular epidemiology and genetic mechanisms of transmitted HIV-1 drug resistance: an individual-patient- and sequence-level meta-analysis. *PLoS Med*. 2015;12(4):e1001810. Available at: https://pubmed.ncbi.nlm.nih.gov/25849352.

26. Buchacz K, Young B, Palella FJ, Jr., et al. Trends in use of genotypic resistance testing and frequency of major drug resistance among antiretroviral-naive persons in the HIV Outpatient Study, 1999–2011. *J Antimicrob Chemother*. 2015;70(8):2337-2346. Available at: https://pubmed.ncbi.nlm.nih.gov/25979729.

27. McClung RP, Oster AM, Ocfemia MCB, et al. Transmitted drug resistance among HIV-1 diagnoses in the United States, 2014–2018. *Clin Infect Dis*. 2021. Available at: https://pubmed.ncbi.nlm.nih.gov/34175948.

28. Lockman S, Brummel SS, Ziemba L, et al. Efficacy and safety of dolutegravir with emtricitabine and tenofovir alafenamide fumarate or tenofovir disoproxil fumarate, and efavirenz, emtricitabine, and tenofovir disoproxil fumarate HIV antiretroviral therapy regimens started in pregnancy (IMPAACT 2010/VESTED): a multicentre, open-label, randomised, controlled, phase 3 trial. *Lancet*. 2021;397(10281):1276-1292. Available at: https://pubmed.ncbi.nlm.nih.gov/33812487.

29. Hoenigl M, Chaillon A, Moore DJ, et al. Rapid HIV viral load suppression in those initiating antiretroviral therapy at first visit after HIV diagnosis. *Sci Rep*. 2016;6:32947. Available at: https://pubmed.ncbi.nlm.nih.gov/27597312.

30. Venter WDF, Moorhouse M, Sokhela S, et al. Dolutegravir plus two different prodrugs of tenofovir to treat HIV. *N Engl J Med*. 2019;381(9):803-815. Available at: https://pubmed.ncbi.nlm.nih.gov/31339677.

31. Girometti N, Lander F, McOwan A, et al. Rapid ART start in early HIV infection: time to viral load suppression and retention in care in a London cohort. *HIV Med*. 2020;21(9):613-615. Available at: https://pubmed.ncbi.nlm.nih.gov/32869951.

32. Kintu K, Malaba TR, Nakibuka J, et al. Dolutegravir versus efavirenz in women starting HIV therapy in late pregnancy (DolPHIN-2): an open-label, randomised controlled trial. *Lancet HIV*. 2020;7(5):e332-e339. Available at: https://pubmed.ncbi.nlm.nih.gov/32386721.

33. Malaba TR, Nakatudde I, Kintu K, et al. 72 weeks post-partum follow-up of dolutegravir versus efavirenz initiated in late pregnancy (DolPHIN-2): an open-label, randomised controlled study. *Lancet HIV*. 2022;9(8):e534-e543. Available at: https://pubmed.ncbi.nlm.nih.gov/35905752.