Table 17d. Antiretroviral Therapy–Associated Adverse Effects and Management Recommendations—Hematologic Effects

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Adverse Effects	Associated ARVs	Onset/Clinical Manifestations	Estimated Frequency	Risk Factors	Prevention/ Monitoring	Management
Anemia[a]	ZDV	Onset • Variable; weeks to months after starting therapy Presentation *More Common* • Asymptomatic • Mild fatigue • Pallor • Tachypnea *Rare* • Congestive heart failure	Newborns Exposed to HIV • Severe anemia is uncommon but might be coincident with physiologic Hgb nadir. Children With HIV Who Are Taking ARV Drugs • Anemia is two to three times more common with ZDV-containing regimens than with all other regimens.	Newborns Exposed to HIV • Premature birth is the most common risk factor. • *In utero* exposure to ZDV-containing regimens • Advanced maternal HIV • Neonatal blood loss • Combination ARV prophylaxis or presumptive HIV therapy, although no particular regimen has been identified as being worse than others. Children With HIV Who Are Taking ARV Drugs • Underlying hemoglobinopathy (e.g., sickle cell disease, G6PD deficiency)	Newborns Exposed to HIV • Obtain CBC at birth. • Consider repeating CBC at 4 weeks for neonates who are at higher risk (e.g., those born prematurely or who are known to have low birth Hgb) and for neonates who receive ZDV beyond 4 weeks. Children With HIV Who Are Taking ARV Drugs • Avoid using ZDV in children with severe anemia when alternative agents are available. • Obtain CBC as part of routine care (see Clinical and Laboratory Monitoring of Pediatric HIV Infection).	Newborns Exposed to HIV • Anemia rarely requires intervention unless it is symptomatic or Hgb <7.0 g/dL. • ZDV administration can be limited to 4 weeks in low-risk neonates (see Antiretroviral Management of Newborns With Perinatal HIV Exposure or HIV Infection). Children With HIV Who Are Taking ARV Drugs • Discontinue non-ARV, marrow-toxic drugs, if feasible. • Treat coexisting iron deficiency, OIs, and malignancies. • For persistent, severe anemia that is thought to be associated with ARV drugs (typically macrocytic anemia), switch to a regimen that does not contain ZDV.

Table 17d. Antiretroviral Therapy–Associated Adverse Effects and Management Recommendations—Hematologic Effects

Adverse Effects	Associated ARVs	Onset/Clinical Manifestations	Estimated Frequency	Risk Factors	Prevention/ Monitoring	Management
				• Myelosuppressive drugs (e.g., TMP-SMX, rifabutin) • Iron deficiency • Advanced or poorly controlled HIV disease • OIs of the bone marrow • Malnutrition		
Macrocytosis	ZDV	Onset • Within days or weeks of starting therapy Presentation • Asymptomatic, but MCV often is >100 fL • Sometimes associated with anemia	>90% to 95% for all ages	None	No monitoring required—macrocytosis can be detected if CBC is obtained as part of routine care (see Clinical and Laboratory Monitoring of Pediatric HIV Infection).	No management required.
Neutropenia[a]	ZDV	Onset • Variable Presentation • Asymptomatic	Newborns Exposed to HIV • Rare Children With HIV Who Are Taking ARV Drugs • 2% to 4% of children on ARV drugs	Newborns Exposed to HIV • *In utero* exposure to ARV drugs • Combination ARV prophylaxis, particularly ZDV plus 3TC and NVP	Children With HIV Who Are Taking ARV Drugs • Obtain CBC as part of routine care.	Newborns Exposed to HIV • No established threshold for intervention; some experts would consider using an alternative NRTI for prophylaxis if ANC reaches <500 cells/mm^3. ZDV administration can be limited to 4 weeks in low-risk neonates (see Antiretroviral Management of Newborns With Perinatal HIV Exposure or HIV Infection).

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Adverse Effects	Associated ARVs	Onset/Clinical Manifestations	Estimated Frequency	Risk Factors	Prevention/ Monitoring	Management
			• Highest rates occur in children on ZDV-containing regimens	Children With HIV Who Are Taking ARV Drugs • Advanced or poorly controlled HIV infection • Myelosuppressive drugs (e.g., TMP-SMX, ganciclovir, hydroxyurea, rifabutin)		Children With HIV Who Are Taking ARV Drugs • Discontinue non-ARV, marrow-toxic drugs, if feasible. • Treat coexisting OIs and malignancies. • In cases of persistent, severe neutropenia that is thought to be associated with ARV drugs, switch to a regimen that does not contain ZDV.

[a] HIV infection itself, OIs, and medications that are used to prevent OIs (e.g., TMP-SMX) can all contribute to anemia and neutropenia. Prolonged use of NVP with ZDV in three drug regimens for the prevention of perinatal HIV transmission has been associated with increased rates of anemia and neutropenia in some, but not all, studies. The effects are of uncertain clinical significance and appear to be transient.

Key: 3TC = lamivudine; ANC = absolute neutrophil count; ARV = antiretroviral; CBC = complete blood count; fL = femtoliter; G6PD = glucose-6-phosphate dehydrogenase; g/dL = grams per deciliter; Hgb = hemoglobin; MCV = mean cell volume; NRTI = nucleoside reverse transcriptase inhibitor; NVP = nevirapine; OI = opportunistic infection; TMP-SMX = trimethoprim-sulfamethoxazole; ZDV = zidovudine

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