### Table 15d. Antiretroviral-Therapy-Associated Adverse Effects and Management Recommendations—Hematologic Effects  
(Last updated May 22, 2018; last reviewed May 22, 2018)  
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<table>
<thead>
<tr>
<th>Adverse Effects</th>
<th>Associated ARVs</th>
<th>Onset/Clinical Manifestations</th>
<th>Estimated Frequency</th>
<th>Risk Factors</th>
<th>Prevention/Monitoring</th>
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</table>
| Anemia*         | ZDV             | Onset:  • Variable, weeks to months  
Presentation  Most Commonly:  • Asymptomatic or mild fatigue  
• Pallor  
• Tachypnea  
Rarely:  • Congestive heart failure  
Newborns Exposed to HIV:  • Severe anemia is uncommon, but may be seen coincident with physiologic Hgb nadir.  
Children with HIV Taking ARVs:  • 2–3 times more common with ZDV-containing regimens  
Newborns Exposed to HIV:  • Premature birth  
• In utero exposure to ZDV-containing regimens  
• Advanced maternal HIV  
• Neonatal blood loss  
• Combination ARV prophylaxis, particularly with ZDV plus 3TC  
Children with HIV Taking ARVs:  • Underlying hemoglobinopathy (e.g., sickle cell disease, G6PD deficiency)  
• Myelosuppressive drugs (e.g., TMP-SMX, rifabutin)  
• Iron deficiency  
• Advanced or poorly controlled HIV disease  
• Malnutrition  
Newborns Exposed to HIV:  • Obtain CBC at birth.  
• Consider repeat CBC at 4 weeks for neonates who are at higher risk (e.g., those born prematurely or known to have low birth Hgb) and if ZDV is continued beyond 4 weeks.  
Children with HIV Taking ARVs:  • Avoid ZDV in children with severe anemia when alternative agents are available.  
• Obtain CBC as part of routine care (see Clinical and Laboratory Monitoring section).  
| None required—detected if CBC obtained as part of routine care (see Clinical and Laboratory Monitoring section).  
| Newborns Exposed to HIV:  • Anemia rarely requires intervention unless Hgb is <7.0 g/dL or it is associated with symptoms.  
• ZDV administration can be limited to 4 weeks in low-risk neonates (see Antiretroviral Management of Newborns with Perinatal HIV Exposure or Perinatal HIV).  
Children with HIV Taking ARVs:  • Discontinue non-ARV, marrow-toxic drugs, if feasible.  
• Treat coexisting iron deficiency, OIs, and malignancies.  
• For persistent severe anemia thought to be associated with ARVs (typically macrocytic anemia), switch to a regimen that does not contain ZDV.  
| Newborns Exposed to HIV:  • Obtain CBC at birth.  
• Consider repeat CBC at 4 weeks for neonates who are at higher risk (e.g., those born prematurely or known to have low birth Hgb) and if ZDV is continued beyond 4 weeks.  
Children with HIV Taking ARVs:  • Avoid ZDV in children with severe anemia when alternative agents are available.  
• Obtain CBC as part of routine care (see Clinical and Laboratory Monitoring section).  
| None required |

| Macrocytosis | ZDV | Onset:  • Within days to weeks of starting therapy  
• MCV often >100 fL  
Presentation:  • Asymptomatic  
• Sometimes associated with anemia  
>90% to 95%, all ages | None | None required—detected if CBC obtained as part of routine care (see Clinical and Laboratory Monitoring section).  
| Newborns Exposed to HIV:  • Obtain CBC at birth.  
• Consider repeat CBC at 4 weeks for neonates who are at higher risk (e.g., those born prematurely or known to have low birth Hgb) and if ZDV is continued beyond 4 weeks.  
Children with HIV Taking ARVs:  • Avoid ZDV in children with severe anemia when alternative agents are available.  
• Obtain CBC as part of routine care (see Clinical and Laboratory Monitoring section).  
| None required |
### Table 15d. Antiretroviral-Therapy-Associated Adverse Effects and Management Recommendations—Hematologic Effects  
(last updated May 22, 2018; last reviewed May 22, 2018) (page 2 of 2)

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| Neutropenia<sup>a</sup> | ZDV | Onset:  
• Variable  
Presentation:  
• Asymptomatic | Newborns Exposed to HIV:  
• Variable  
Children with HIV Taking ARVs:  
• 2% to 4% of children on ARVs  
• Highest rates with ZDV-containing regimens | Newborns Exposed to HIV:  
• In utero exposure to ARVs  
• Combination ARV prophylaxis, particularly with ZDV plus 3TC  
Children with HIV Taking ARVs:  
• Advanced or poorly controlled HIV infection  
• Myelosuppressive drugs (e.g., TMP-SMX, ganciclovir, hydroxyurea, rifabutin) | Children with HIV Taking ARVs:  
• 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<sup>3</sup>.  
ZDV administration can be limited to 4 weeks in low-risk neonates (see Antiretroviral Management of Newborns with Perinatal HIV Exposure or Perinatal HIV).  
Children with HIV Taking ARVs:  
• Discontinue non-ARV marrow-toxic drugs, if feasible.  
• Treat coexisting OIs and malignancies.  
• For persistent severe neutropenia thought to be associated with ARVs, change to a regimen that does not contain ZDV. |

<sup>a</sup>HIV infection itself, OIs, and medications used to prevent OIs, such as TMP-SMX, may all contribute to anemia, neutropenia, and thrombocytopenia.

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

### References


