## Table 15d. Antiretroviral-Therapy-Associated Adverse Effects and Management Recommendations—Hematologic Effects

_Last updated May 22, 2018; last reviewed May 22, 2018_

<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>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anemia</strong></td>
<td>ZDV</td>
<td>Onset: • Variable, weeks to months Presentation Most Commonly: • Asymptomatic or mild fatigue • Pallor • Tachypnea Rarely: • Congestive heart failure</td>
<td>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</td>
<td>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</td>
<td>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)</td>
<td>Newborns Exposed to HIV: • Anemia rarely requires intervention unless Hgb is &lt;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.</td>
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<tr>
<td><strong>Macrocytosis</strong></td>
<td>ZDV</td>
<td>Onset: • Within days to weeks of starting therapy • MCV often &gt;100 fL Presentation: • Asymptomatic • Sometimes associated with anemia</td>
<td>&gt;90% to 95%, all ages</td>
<td>None</td>
<td>None required—detected if CBC obtained as part of routine care (see Clinical and Laboratory Monitoring section).</td>
<td>None required</td>
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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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<tr>
<td>Neutropenia*</td>
<td>ZDV</td>
<td>Onset:</td>
<td>Newborns Exposed to HIV:</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>• Variable</td>
<td>• In utero exposure to ARVs</td>
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<td></td>
<td></td>
<td>Presentation:</td>
<td>Combination ARV prophylaxis, particularly with ZDV plus 3TC</td>
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<tr>
<td></td>
<td></td>
<td>• Asymptomatic</td>
<td>Children with HIV Taking ARVs:</td>
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<td></td>
<td></td>
<td></td>
<td>• Advanced or poorly controlled HIV infection</td>
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<td></td>
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<td></td>
<td>• Myelosuppressive drugs (e.g., TMP-SMX, ganciclovir, hydroxyurea, rifabutin)</td>
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</table>

Newborns Exposed to HIV: Newborns Exposed to HIV: Neutropenia: Neutropenia:
- Rare
- Children with HIV Taking ARVs: Children with HIV Taking ARVs: Neutropenia:
  - 2% to 4% of children on ARVs
  - Highest rates with ZDV-containing regimens
- Children with HIV Taking ARVs: Children with HIV Taking ARVs: Neutropenia:
- Advanced or poorly controlled HIV infection
- Myelosuppressive drugs (e.g., TMP-SMX, ganciclovir, hydroxyurea, rifabutin)
- Children with HIV Taking ARVs: Children with HIV Taking ARVs: Neutropenia:
- Obtain CBC as part of routine care.
- Newborns Exposed to 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.

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

Guidelines for the Use of Antiretroviral Agents in Pediatric HIV Infection K-21

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