Guidelines for the Use of Antiretroviral Agents in Pediatric HIV Infection

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Table 13j. Antiretroviral Therapy-Associated Adverse Effects and Management Recommendations—Osteopenia and Osteoporosis (Last updated April 27, 2017; last reviewed April 27, 2017)

<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>Osteopenia and Osteoporosis</td>
<td>Any ART regimen</td>
<td>Onset:</td>
<td>• Any age; decrease in BMD usually seen early after initiation of ART.</td>
<td>BMD z Score Less Than -2.0</td>
<td>Longer duration and greater severity of HIV disease</td>
<td>Prevent:</td>
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<tr>
<td>Specific Agents of Possible Concern:</td>
<td>TDF</td>
<td>Presentation:</td>
<td>• 10% in U.S. cohorts</td>
<td>Growth or pubertal delay</td>
<td>• Ensure sufficient calcium intake and vitamin D sufficiency.</td>
<td>Consider change in ARV regimen (e.g., changing TDF to TAF).</td>
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<tr>
<td></td>
<td>PIs, especially LPV/r</td>
<td>Most commonly asymptomatic</td>
<td>• Approximately 20% to 30% in international cohorts</td>
<td>Low BMI</td>
<td>• Encourage weight-bearing exercise.</td>
<td>Role of bisphosphonates not established in children with HIV infection.</td>
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<tr>
<td></td>
<td></td>
<td>Rarely presents as osteoporosis; a clinical diagnosis defined by evidence of bone fragility (e.g., fracture with minimal trauma).</td>
<td></td>
<td>Lipodystrophy</td>
<td>• Minimize modifiable risk factors (e.g., smoking, low BMI, use of steroids or medroxyprogesterone).</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Non-black race</td>
<td>Monitoring:</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Smoking</td>
<td>• Assess nutritional intake (calcium, vitamin D, and total calories).</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Prolonged systemic corticosteroid use</td>
<td>• Consider measuring serum 25-OH-vitamin D level.a</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Medroxyprogesterone use</td>
<td>• DXA.a</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Limited weight-bearing exercise</td>
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</tbody>
</table>

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*a Some experts would periodically measure 25-OH-vitamin D, especially in urban youth with HIV infection, because in that population, the prevalence of vitamin D insufficiency is high.

*b Until more data are available about the long-term effects of TDF on bone mineral acquisition in childhood, some experts would obtain a DXA at baseline and every 6 to 12 months for prepubertal children and children in early puberty who are initiating treatment with TDF. DXA could also be considered in adolescent women on TDF and medroxyprogesterone and in children with indications not uniquely related to HIV infection (such as cerebral palsy).

**Key to Acronyms:** ART = antiretroviral therapy; ARV = antiretroviral; BMD = bone mineral density; BMI = body mass index; DXA = dual-energy x-ray absorptiometry; LPV/r = lopinavir/ritonavir; PI = protease inhibitor; TDF = tenofovir disoproxil fumarate, TAF= tenofovir alafenamide

**References**

**Osteopenia and Osteoporosis**


