Guidelines for the Use of Antiretroviral Agents in Pediatric HIV Infection

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### Table 15j. Antiretroviral-Therapy-Associated Adverse Effects and Management Recommendations—Osteopenia and Osteoporosis

(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>Osteopenia and Osteoporosis</td>
<td>Any ART regimen</td>
<td>Onset:</td>
<td>BMD z Score Less Than -2.0:</td>
<td>Longer duration and greater severity of HIV disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific Agents of Concern:</td>
<td>TDF</td>
<td>• Any age; decrease in BMD usually seen soon after initiation of ART.</td>
<td>• &lt;10% in U.S. cohorts</td>
<td>Vitamin D insufficiency/deficiency</td>
<td>Prevention:</td>
<td>Same options as for prevention.</td>
</tr>
<tr>
<td></td>
<td>PIs, especially LPV/r</td>
<td>Presentation:</td>
<td>• Approximately 20% to 30% in international cohorts</td>
<td>Delayed growth or pubertal delay</td>
<td>• Encourage weight-bearing exercise.</td>
<td>Consider changing the ARV regimen (e.g., switching from TDF to TAF, and/or from LPV/r to EFV or an INSTI whenever possible).</td>
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<tr>
<td></td>
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<td></td>
<td>Low BMI</td>
<td>• Minimize modifiable risk factors (e.g., smoking, low BMI, use of steroids or medroxyprogesterone).</td>
<td>Treat with vitamin D3 to raise serum 25-OH-vitamin D concentrations to &gt;30 ng/mL.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Lipodystrophy</td>
<td>• Use TAF instead of TDF whenever possible.</td>
<td>The role of bisphosphonates in managing osteopenia and osteoporosis in children with HIV has not been established.</td>
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<td></td>
<td></td>
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<td></td>
<td>Non-black race</td>
<td>Monitoring:</td>
<td></td>
</tr>
<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>Prolonged systemic corticosteroid use</td>
<td>• Strongly consider measuring serum 25-OH-vitamin D levels, particularly in those patients taking ARVs of concern.</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Medroxyprogesterone use</td>
<td>• Obtain a DXA.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lack of weight-bearing exercise</td>
<td></td>
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</tbody>
</table>

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

**References**


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