Table 1j. 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>BMD z Score Less Than -2.0</td>
<td></td>
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<td>Same options as for prevention.</td>
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<tr>
<td>Specific Agents of Possible Concern:</td>
<td>TDF</td>
<td>• Any age; decrease in BMD usually seen early after initiation of ART.</td>
<td>• &lt;10% in U.S. cohorts</td>
<td>Longer duration and greater severity of HIV disease</td>
<td>• Ensure sufficient calcium intake and vitamin D sufficiency.</td>
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<tr>
<td></td>
<td>PIs, especially LPV/r</td>
<td>Presentation:</td>
<td>• Approximately 20% to 30% in international cohorts</td>
<td>Growth or pubertal delay</td>
<td>• Encourage weight-bearing exercise.</td>
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<td></td>
<td></td>
<td>Most commonly asymptomatic</td>
<td></td>
<td>Low BMI</td>
<td>• Minimize modifiable risk factors (e.g., smoking, low BMI, use of steroids or medroxyprogesterone).</td>
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<td></td>
<td>Rarely presents as osteoporosis; a clinical diagnosis defined by evidence of bone fragility (e.g., fracture with minimal trauma).</td>
<td>Smoking</td>
<td>Lipodystrophy</td>
<td>Monitoring:</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Prolonged systemic corticosteroid use</td>
<td>Non-black race</td>
<td>• Assess nutritional intake (calcium, vitamin D, and total calories).</td>
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<td></td>
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<td></td>
<td>Medroxyprogesterone use</td>
<td>Limited weight-bearing exercise</td>
<td>• Consider measuring serum 25-OH-vitamin D level.</td>
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<td></td>
<td>• DXA.a</td>
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</tr>
</tbody>
</table>

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


