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

---

### References

**Osteopenia and Osteoporosis**


