### Table 15j. Antiretroviral Therapy-Associated Adverse Effects and Management Recommendations—Osteopenia and Osteoporosis  
*(Last updated April 16, 2019; last reviewed April 16, 2019)*

<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>
</table>
| Osteopenia and Osteoporosis | Any ART regimen | Onset: Any age; decrease in BMD is usually seen soon after initiation of ART.  
Presentation: Usually asymptomatic. Rarely presents as osteoporosis, a clinical diagnosis defined by evidence of bone fragility (e.g., fracture with minimal trauma) | BMD \(z\) Score Less Than -2.0:  
<10% in U.S. cohorts  
Approximately 20% to 30% in international cohorts | 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 | Prevention:  
Ensure that the patient has sufficient intake and levels of both calcium and vitamin D  
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.  
Use TDF with EFV or an un-boosted INSTI.  
When using TDF in a regimen, consider supplementing with vitamin D3 at a daily dose of 1,000–4,000 IU  
Monitoring:  
Assess nutritional intake (calcium, vitamin D, and total calories).  
Strongly consider measuring serum 25-OH-vitamin D levels, particularly in patients who are taking ARV drugs of concern.  
Obtain a DXA.  
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 un-boosted INSTI whenever possible).  
Treat patient with vitamin D3 to raise serum 25-OH-vitamin D concentrations to >30 ng/mL. Vitamin D3 levels should be monitored in patients who are receiving a daily dose of vitamin D3 >4,000 IU.  
The role of bisphosphonates in managing osteopenia and osteoporosis in children with HIV has not been established. | | |

---

*a* Some experts periodically measure 25-OH-vitamin D. This is especially important in children and adolescents with HIV who live in urban areas; the prevalence of vitamin D insufficiency is high in that population.

*b* Until more data are available on the long-term effects of TDF on bone mineral acquisition in childhood, DXA scanning is not usually recommended for children who are being treated with TDF. Obtaining a DXA could be considered for adolescent women who are receiving TDF and medroxyprogesterone and for children with indications that are 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; COBI = cobicistat; DXA = dual-energy x-ray absorptiometry; EFV = efavirenz; INSTI = integrase strand transfer inhibitor; IU = international unit; LPV/r = lopinavir/ritonavir; PI = protease inhibitor; RTV = ritonavir; TAF = tenofovir alafenamide; TDF = tenofovir disoproxil fumarate.

---

*Guidelines for the Use of Antiretroviral Agents in Pediatric HIV Infection*  
K-38
References


Guidelines for the Use of Antiretroviral Agents in Pediatric HIV Infection

Downloaded from https://aidsinfo.nih.gov/guidelines on 11/11/2019


