# Guidelines for the Use of Antiretroviral Agents in Pediatric HIV Infection

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## Table 17j. Antiretroviral Therapy-Associated Adverse Effects and Management Recommendations—Osteopenia, Osteoporosis, Osteonecrosis (page 1 of 2) (Last updated November 1, 2012; last reviewed November 1, 2012)

| Adverse Effects | Associated ARVs | Onset/Clinical Manifestations | Estimated Frequency | Risk Factors | Prevention / Monitoring | Management |
|---|---|---|---|---|---|---|
| Osteopenia and osteoporosis | cART, especially following initiation of cART, regardless of regimen.<br><br>Specific agents of possible concern: TDF, d4T, and PIs | Onset:<br>Any age; greatest risk in months after initiation of associated ARV.<br><br>Presentation:<br>Most commonly asymptomatic; fracture (rare).<br><br>Osteoporosis diagnosis in children requires clinical evidence of bone fragility (e.g., fracture with minimal trauma) and cannot rely solely on measured low BMD. | Low BMD:<br>20% of children treated with cART had BMD *z* score < -1.5. | Longer duration of HIV infection<br><br>Greater severity of HIV disease<br><br>Growth delay, pubertal delay<br><br>Low BMI<br><br>Lipodystrophy<br><br>Non-black race<br><br>Smoking<br><br>Corticosteroid use<br><br>Medroxyprogesterone use | Prevention:<br>Ensure sufficient calcium and vitamin D intake.<br><br>Encourage weight-bearing exercise.<br><br>Minimize modifiable risk factors (smoking, low BMI, steroid use).<br><br>Monitoring:<br>Assess nutritional intake (calcium, vitamin D, and total calories).<br><br>Obtain serum 25-OH-vitamin D.[a]<br><br>Obtain DXA.[b] | Ensure sufficient calcium and vitamin D intake.<br><br>Encourage weight-bearing exercise.<br><br>Reduce modifiable risk factors (smoking, low BMI, use of steroids, medroxyprogesterone).<br><br>Role of bisphosphonates not established in children.<br><br>Consider change in ARV regimen. |
| Osteonecrosis | No specific ARV identified; may be related to HIV infection itself. | Onset:<br>Any age<br><br>Presentation:<br>Limp; hip or other periarticular pain<br><br>Asymptomatic reported in adults | Prevalence:<br>0.2% in children<br><br>Incidence:<br>0.03% per year in children | Children:<br>Unknown<br><br>Adults:<br>Steroid use<br><br>Alcohol abuse<br><br>Hemoglobinopathies<br><br>Hyperlipidemia<br><br>Pancreatitis<br><br>Osteopenia<br><br>Osteoporosis<br><br>Hypercoagulable states | Prevention:<br>Minimize steroid and alcohol use.<br><br>Monitoring:<br>Consider diagnostic evaluation in patients with unexplained limp, hip or other periarticular pain. | Confirm diagnosis:<br>Obtain plain radiographs and MRI; bone scan or CT if negative x-ray/MRI but clinical suspicion high.<br><br>Treatment:<br>*Early stages:*<br>Decrease weight bearing on affected joint and use analgesic. Limited evidence for use of bisphosphonates.<br><br>*Later stages:*<br>Consider surgical intervention. |



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## Table 17j. Antiretroviral Therapy-Associated Adverse Effects and Management Recommendations—Osteopenia, Osteoporosis, Osteonecrosis (page 2 of 2) (Last updated November 1, 2012; last reviewed November 1, 2012)

[a] Some experts would periodically measure 25-OH-vitamin D, especially in HIV-infected urban youth because, in this population, the prevalence of vitamin D insufficiency is high.

[b] Until more data are available about the long-term effects of tenofovir 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 tenofovir. DXA should also be obtained in children with indications not uniquely related to HIV infection (such as cerebral palsy).

**Key to Acronyms:** ARVs = antiretrovirals, BMD = bone mineral density, BMI = body mass index, cART = combination antiretroviral therapy, CT = computed tomography, d4T = stavudine, DXA = dual energy x-ray absorptiometry, MRI = magnetic resonance imaging, PIs = protease inhibitors, TDF = tenofovir disoproxil fumarate

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### Osteopenia and Osteoporosis


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