# Table 15b. Antiretroviral Therapy-Associated Adverse Effects and Management Recommendations—Dyslipidemia

(Last updated April 27, 2017; last reviewed April 27, 2017) (page 1 of 2)

<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>Dyslipidemia</td>
<td>PIs:</td>
<td>Onset: As early as 2 weeks to months after beginning therapy</td>
<td>Reported frequency varies with specific ARV regimen, duration of ART and specific laboratory parameters used to diagnose lipid abnormalities.</td>
<td>Advanced-stage HIV disease</td>
<td>Prevention: Low-fat diet</td>
<td>Assessment of additional CVD risk factors should be done in all patients. Patients living with HIV are considered to be at moderate risk of CVD. (b)</td>
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<td></td>
<td>• All PIs, especially RTV-boosted PIs; lower incidence reported with DRV/r and ATV with or without RTV.</td>
<td>Presentation PIs:</td>
<td>10% to 20% in young children receiving LPV/RTV.</td>
<td>High-fat, high-cholesterol diet</td>
<td>Exercise</td>
<td>Counsel on lifestyle modification, dietary interventions (e.g., a diet low in saturated fat, cholesterol, and refined sugars particularly in case of ↑TG, elimination of transfat, physical activity, smoking cessation) for an adequate trial period (3–6 months). Consider consultation with dietician.</td>
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<td></td>
<td>• Especially d4T</td>
<td>NNRTIs:</td>
<td>40% to 75% of older children and adolescents with prolonged ART history will have lipid abnormalities.</td>
<td>Lack of exercise</td>
<td>Smoking-prevention counseling</td>
<td>ART regimen changes can be considered. Discontinue d4T or substitute a PI-sparing regimen or PI-based regimen with a more favorable lipid profile.</td>
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<td></td>
<td>NRTIs:</td>
<td>• EFV &gt; NVP, RPV, and ETR</td>
<td>NRTIs:</td>
<td>Obesity</td>
<td>Avoid d4T</td>
<td>Consider lipid-lowering therapy in consultation with a lipid specialist if ≥6-month trial of lifestyle modification fails.</td>
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<tr>
<td></td>
<td></td>
<td>• ↑LDL-C, TC, and TG</td>
<td></td>
<td>Hypertension</td>
<td>Monitoring(a)</td>
<td>Some experts suggest treatment in children receiving ARV drugs according to NHLBI cardiovascular risk reduction guidelines for children aged ≥10 years: LDL-C ≥190 mg/dL, regardless of additional risk factors; LDL-C ≥160 mg/dL or LDL-C ≥130 mg/dL based on presence of additional risk factors and risk conditions.(b)</td>
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<td></td>
<td>Smoking</td>
<td>Adolescents and Adults:</td>
<td>The minimal goal of therapy should be to achieve and maintain a LDL-C value below 130 mg/dL, while maintaining viral control.</td>
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<td></td>
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<td></td>
<td>Family history of dyslipidemia or premature CVD</td>
<td>• Monitor 12-hour FLP, which includes TC, HDL-C, non-HDL-C, LDL-C, and TG, every 6–12 months. Obtain FLPs twice (&gt;2 weeks but ≤3 months apart, average results) before initiating or changing lipid-lowering therapy.</td>
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<td>Metabolic syndrome</td>
<td>Children (Aged ≥2 Years) without Lipid Abnormalities or Additional Risk Factors:</td>
<td>Children with Lipid Abnormalities and/or Additional Risk Factors:</td>
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<td></td>
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<td>Fat maldistribution</td>
<td>• Obtain non-fasting screening lipid profiles (at entry into care) and then, if levels are normal, every 6–12 months. If TG or LDL-C is elevated, obtain fasting blood tests.</td>
<td>• Obtain 12-hour FLP before initiating or changing therapy and every 6 months thereafter (more often if indicated).</td>
</tr>
</tbody>
</table>

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\(a\) The minimal goal of therapy should be to achieve and maintain a LDL-C value below 130 mg/dL, while maintaining viral control.

\(b\) Assessment of additional CVD risk factors should be done in all patients. Patients living with HIV are considered to be at moderate risk of CVD.
### Table 15b. Antiretroviral Therapy-Associated Adverse Effects and Management Recommendations—Dyslipidemia

(Last updated April 27, 2017; last reviewed April 27, 2017) (page 2 of 2)

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<td>Dyslipidemia, continued</td>
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- Given the burden of collecting fasting blood samples, some practitioners routinely measure cholesterol and triglycerides from non-fasting blood samples and follow up abnormal values with a test done in the fasted state.


- The risks of new treatment-related toxicities and virologic failure that could occur with changes in therapy must be weighed against the potential risk of drug interactions and toxicities associated with the use of lipid-lowering agents.

- Statins (HMG-CoA reductase inhibitors) are contraindicated in pregnancy (potentially teratogenic) and should not be used in patients who may become pregnant. Multiple drug interactions exist between ARV drugs and statins (exception pravastatin, which is not dependent on CYP3A4 for metabolism). Pravastatin, atorvastatin, rosuvastatin (Crestor®), fluvastatin, and ezetimibe (Zetia®) are approved for use in children aged ≥10 years. For additional information, see the PI, NNRTI, NRTI, and INSTI Drug Interactions Tables in the Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents.

**Key to Acronyms:** ALT = alanine aminotransferase; ART = antiretroviral therapy; ARV = antiretroviral; AST = aspartate aminotransferase; ATV = atazanavir; CK = creatine kinase; CVD = cardiovascular disease; CYP3A4 = cytochrome P450 3A4; d4T = stavudine; DRV = darunavir; DRV/r = ritonavir-boosted darunavir; EFV = efavirenz; ETR = etravirine; FLP = fasting lipid profile; HDL-C = high-density lipoprotein cholesterol; LDL-C = low-density lipoprotein cholesterol; LFT = liver function test; LPV = lopinavir; NHLBI = National Heart, Lung, and Blood Institute; NNRTI = non-nucleoside reverse transcriptase inhibitor; NRTI = nucleoside reverse transcriptase inhibitor; NVP = nevirapine; PI = protease inhibitor; PUFA = polyunsaturated fatty acid; RPV = rilpivirine; RTV = ritonavir; TC = total cholesterol; TG = triglyceride.
References


