### Table 17b. Antiretroviral Therapy–Associated Adverse Effects and Management Recommendations—Dyslipidemia

**Updated:** April 11, 2022  
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<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</td>
<td>Reported frequency varies with specific ARV regimen, duration of ART, and the specific laboratory parameters used to diagnose lipid abnormalities.</td>
<td>Advanced-stage HIV disease, High-fat, high-cholesterol diet, Sedentary lifestyle, Obesity, Hypertension, Smoking, Family history of dyslipidemia or premature ASCVD, Metabolic syndrome, Fat maldistribution</td>
<td>Prevention - Low-fat diet, Exercise, Smoking-prevention counseling</td>
<td>Assess all patients for additional ASCVD risk factors. Patients with HIV are considered to be at moderate risk for ASCVD. ARV regimen changes should be considered, especially when the patient is receiving older PIs (e.g., LPV/r) and/or RTV boosting. Switching to a PI-sparing regimen, a PI-based regimen with a more favorable lipid profile, or Cobi boosting causes a decline in LDL-C or TG values. The lipid-lowering effect of an ARV regimen switch on LDL-C is less pronounced than with statin therapy but may be enough to re-establish a healthy lipid profile. Refer patients to a lipid specialist early if LDL-C is ≥250 mg/dL or TG is ≥500 mg/dL. If LDL-C is ≥130 mg/dL but &lt;250 mg/dL or TG is ≥150 mg/dL but &lt;500 mg/dL, the following staged treatment approach is recommended by the NHLBI guidelines:</td>
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</table>
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<table>
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<tr>
<th>NNRTIs</th>
<th>recent meta-analysis and a recent review of a large consortium of prospective observational cohorts, respectively.</th>
<th>12 months (for normal results).</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• ↑ LDL-C, TC, and HDL-C</td>
<td>• If TG or LDL-C is elevated</td>
<td>• Implement diet, nutrition, and lifestyle management for 6–9 months. Consult with a dietitian if one is available.</td>
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<td>or if a patient has additional risk factors, obtain FLP.</td>
<td>• If a 6- to 9-month trial of lifestyle modification fails and the patient is aged ≥10 years, consider implementing lipid-lowering therapy after consulting a lipid specialist.</td>
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<td>Statin therapy should be considered for patients with elevated LDL-C levels. NHLBI guidelines provide recommendations for statin therapy in patients with specific LDL-C levels and risk factors.b Concurrent substitution—preferably to ARVs with no inhibitory or inducing effect on CYP3A4 or OATP1B1 (e.g., INSTI)—also should be considered as appropriate to limit drug–drug interaction potential.</td>
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<td>Drug therapy can be considered in cases of severe hypertriglyceridemia (TG ≥500 mg/dL). Fibrates (gemfibrozil and fenofibrate) may be used.</td>
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<td>The long-term risks of lipid abnormalities in children who are receiving ART are unclear. However, persistent dyslipidemia in children may lead to premature ASCVD.</td>
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</table>

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Because of the burden of collecting fasting blood samples, some practitioners routinely measure cholesterol and TG from nonfasting blood samples and follow-up abnormal values with a test done in the fasted state.

Refer to the NHLBI guidelines: Expert Panel on Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents.

Key to Symbol:

Key: ALT = alanine aminotransferase; ART = antiretroviral therapy; ARV = antiretroviral; ASCVD = atherosclerotic cardiovascular disease; AST = aspartate aminotransferase; ATV = atazanavir; CK = creatine kinase; COBI = cobicistat; CYP3A4 = cytochrome P450 3A4; DRV = darunavir; DRV/r = darunavir/ritonavir; EFV = efavirenz; ETR = etravirine; EVG/c = elvitegravir/cobicistat; FLP = fasting lipid profile; HDL-C = high-density lipoprotein cholesterol; INSTI = integrase strand transfer inhibitor; LDL-C = low-density lipoprotein cholesterol; LFT = liver function test; LPV/r = lopinavir/ritonavir; NHLBI = National Heart, Lung, and Blood Institute; NNRTI = non-nucleoside reverse transcriptase inhibitor; NRTI = nucleoside reverse transcriptase inhibitor; NVP = nevirapine; OATP1B1 = organic anion transporter polypeptide 1B1; PI = protease inhibitor; PUFA = polyunsaturated fatty acid; RPV = rilpivirine; RTV = ritonavir; TAF = tenofovir alafenamide; TC = total cholesterol; TDF = tenofovir disoproxil fumarate; TG = triglycerides
References


