Guidelines for the Use of Antiretroviral Agents in Pediatric HIV Infection

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### Table 15f. Antiretroviral Therapy-Associated Adverse Effects and Management Recommendations—Insulin Resistance, Asymptomatic Hyperglycemia, Diabetes Mellitus  
(Last updated April 16, 2019; last reviewed April 16, 2019)

<table>
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<th>Adverse Effects</th>
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<th>Onset/Clinical Manifestations</th>
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</table>
| **Insulin Resistance, Asymptomatic Hyperglycemia, DM** | ZDV, LPV/r, and possibly other PIs | **Onset:**  
  - Weeks to months after beginning therapy | **Children:**  
  - Insulin resistance, 6% to 12% (incidence is higher during puberty, 20% to 30%)  
  - Impaired fasting glucose, 0% to 7%  
  - Impaired glucose tolerance, 3% to 4%  
  - DM, 0.2 per 100 child-years | **Risk Factors for Type 2 DM:**  
  - Lipodystrophy  
  - Metabolic syndrome  
  - Family history of DM  
  - High BMI (obesity) | **Prevention:**  
  - Lifestyle modification | **Counsel patient on lifestyle modification (e.g., implementing a diet low in saturated fat, cholesterol, trans fat, and refined sugars; increasing physical activity; ceasing smoking). Recommend that the patient consult with a dietician.** |
| | | **Presentation:**  
  - Asymptomatic fasting hyperglycemia (which sometimes occurs in the setting of lipodystrophy), metabolic syndrome, or growth delay | | | | |
| | | **Symptomatic DM (rare)** | | | | |

*Insulin resistance, asymptomatic hyperglycemia, and DM form a spectrum of increasing severity.

**Insulin Resistance:** Often defined as elevated insulin levels for the level of glucose observed.

**Impaired FPG:** Often defined as an FPG of 100–125 mg/dL.

**Impaired Glucose Tolerance:** Often defined as an elevated 2-hour PG of 140–199 mg/dL in a 75-g OGTT (or, if the patient weighs <43 kg, 1.75 g per kg of glucose up to a maximum of 75 g).

**Diabetes Mellitus:** Often defined as either an FPG ≥126 mg/dL, and RPG ≥200 mg/dL in a patient with hyperglycemia symptoms, an HgbA1c of ≥6.5%, or a 2-hour PG ≥200 mg/dL after an OGTT.

However, the Panel does not recommend performing routine measurements of insulin levels, HgbA1c, or glucose tolerance without consulting an endocrinologist. These guidelines are instead based on the readily available RPG and FPG levels.

**Key to Acronyms:**  
- ABC = abacavir  
- ARV = antiretroviral  
- BMI = body mass index  
- dL = deciliter  
- DM = diabetes mellitus  
- FPG = fasting plasma glucose  
- HgbA1c = glycosylated hemoglobin  
- LPV/r = lopinavir/ritonavir  
- OGTT = oral glucose tolerance test  
- PG = plasma glucose  
- PI = protease inhibitor  
- RPG = random plasma glucose  
- TAF = tenofovir alafenamide  
- TDF = tenofovir disoproxil fumarate  
- ZDV = zidovudine

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References


