Guidelines for the Use of Antiretroviral Agents in Adults and Adolescents with HIV

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Appendix B, Table 3. Characteristics of Nucleoside Reverse Transcriptase Inhibitors (Last updated December 18, 2019; last reviewed December 18, 2019) (page 1 of 4)

The older NRTIs ddI and d4T are no longer commonly used in clinical practice and have been removed from this table. Please refer to the July 10, 2019, version of the guidelines (found in the archived guidelines section of AIDSInfo) or to the FDA product labels for ddI and d4T for information regarding these drugs.

<table>
<thead>
<tr>
<th>Generic Name (Abbreviation)</th>
<th>Trade Name</th>
<th>Formulations</th>
<th>Dosing Recommendations</th>
<th>Elimination/Metabolic Pathway</th>
<th>Serum/Intracellular Half-Lives</th>
<th>Adverse Events</th>
</tr>
</thead>
</table>
| **Abacavir** (ABC) | Ziagen | • 300 mg tablet  
• 20 mg/mL oral solution | Ziagen:  
• ABC 600 mg once daily, or  
• ABC 300 mg twice daily | Metabolized by alcohol dehydrogenase and glucuronyl transferase  
82% of ABC dose is excreted renally as metabolites | 1.5 hours/12–26 hours | Patients who test positive for HLA-B*5701 are at the highest risk of experiencing HSRs. HLA screening should be done before initiating ABC.  
For patients with a history of HSRs, rechallenge is not recommended.  
Symptoms of HSRs may include fever, rash, nausea, vomiting, diarrhea, abdominal pain, malaise, fatigue, or respiratory symptoms (e.g., sore throat, cough, or shortness of breath).  
Some cohort studies suggest an increased risk of MI with recent or current use of ABC, but this risk is not substantiated in other studies. |

**Note:** Generic tablet formulation is available.

**Emtricitabine** (FTC) | Emtriva | • 200 mg hard gelatin capsule  
• 10 mg/mL oral solution | Emtriva Cap:  
• FTC 200 mg once daily  
Oral Solution:  
• FTC 240 mg (24 mL) once daily | 86% of FTC dose is excreted renally | 10 hours/20 hours | Minimal toxicity  
Hyperpigmentation/skin discoloration  
Severe acute exacerbation of hepatitis may occur in patients with HBV/HIV coinfection who discontinue FTC. |
### Lamivudine (3TC)
#### Epivir

**Note:** Generic products are available.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Epivir:</strong> 150 and 300 mg tablets, 10 mg/mL oral solution</td>
<td>3TC 300 mg once daily, or 3TC 150 mg twice daily</td>
<td>70% of 3TC dose is excreted renally</td>
<td>5–7 hours/18–22 hours</td>
<td>Minimal toxicity</td>
</tr>
<tr>
<td><strong>Generic:</strong> 150 and 300 mg tablets, Also available as FDC with ABC and ZDV</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **FDC Tablets that Contain 3TC:**  
  - Cimduo (TDF/3TC)  
  - Combivir (ZDV/3TC)  
  - Epzicom (ABC/3TC)  
  - Temixys (TDF/3TC)  
  - Trizivir (ABC/ZDV/3TC) |                        |                               |                               |               |
| **STRs that Contain 3TC:**  
  - Delstrigo (DOR/TDF/3TC)  
  - Dovato (DTG/3TC)  
  - Symfi (EFV 600 mg/ TDF/3TC)  
  - Symfi Lo (EFV 400 mg/ TDF/3TC)  
  - Triumeq (DTG/ABC/3TC) |                        |                               |                               |               |

**Note:** See Appendix B, Tables 1 and 2 for dosing information for FDC tablets that contain 3TC. Severe acute exacerbation of hepatitis may occur in patients with HBV/HIV coinfection who discontinue 3TC.

### Tenofovir Alafenamide (TAF)
#### Vemlidy

**Note:** Vemlidy is available as a 25-mg tablet for the treatment of HBV.

<table>
<thead>
<tr>
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</tr>
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</table>
| **FDC Tablets that Contain TAF:**  
  - Descovy (TAF/FTC)  
  - Biktarvy (BIC/TAF/FTC)  
  - Genvoya (EVG/c/TAF/FTC)  
  - Odefsey (RPV/TAF/FTC)  
  - Symtuza (DRV/c/TAF/FTC) |                        |                               | 0.5 hours/150–180 hours | Renal insufficiency, Fanconi syndrome, and proximal renal tubulopathy are less likely to occur with TAF than with TDF. Osteomalacia and decreases in BMD are less likely to occur with TAF than with TDF. Severe acute exacerbation of hepatitis may occur in patients with HBV/HIV coinfection who discontinue TAF. Diarrhea, nausea, headache |
| **STRs that Contain TAF:**  
  - Biktarvy (BIC/TAF/FTC)  
  - Genvoya (EVG/c/TAF/FTC)  
  - Odefsey (RPV/TAF/FTC)  
  - Symtuza (DRV/c/TAF/FTC) |                        |                               |                               |               |

See Appendix B, Tables 1 and 2 for dosing information for FDC tablets that contain TAF. Metabolized by cathepsin A. See Appendix B, Table 10 for dose recommendations in patients with renal insufficiency.
### Appendix B, Table 3. Characteristics of Nucleoside Reverse Transcriptase Inhibitors (Last updated December 18, 2019; last reviewed December 18, 2019) (page 3 of 4)

<table>
<thead>
<tr>
<th>Generic Name (Abbreviation)</th>
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<th>Adverse Eventsb</th>
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<tbody>
<tr>
<td><strong>Tenofovir Disoproxil Fumarate (TDF)</strong></td>
<td>Viread</td>
<td>• 150, 200, 250, and 300 mg tablets • 40 mg/g oral powder</td>
<td>Viread: • TDF 300 mg once daily, or • 7.5 level scoops of oral powder once daily (dosing scoop dispensed with each bottle; one level scoop contains 1 g of oral powder). Mix oral powder with 2–4 ounces of a soft food that does not require chewing (e.g., applesauce, yogurt). Do not mix oral powder with liquid. See Appendix B, Tables 1 and 2 for dosing information for FDC tablets that contain TDF.</td>
<td>Renal excretion is the primary route of elimination. See Appendix B, Table 10 for dose recommendations in patients with renal insufficiency.</td>
<td>17 hours&gt;60 hours</td>
<td>Renal insufficiency, Fanconi syndrome, proximal renal tubulopathy Osteomalacia, decrease in BMD Severe acute exacerbation of hepatitis may occur in patients with HBV/HIV coinfection who discontinue TDF. Asthenia, headache, diarrhea, nausea, vomiting, flatulence</td>
</tr>
<tr>
<td><strong>Zidovudine (ZDV)</strong></td>
<td>Retrovir</td>
<td>• 100 mg capsule • 10 mg/mL IV solution • 10 mg/mL oral solution</td>
<td>Retrovir: • ZDV 300 mg twice daily, or • ZDV 200 mg three times a day See Appendix B, Table 2 for dosing information for FDC tablets that contain ZDV.</td>
<td>Metabolized to GAZT Renal excretion of GAZT See Appendix B, Table 10 for dose recommendations in patients with renal insufficiency.</td>
<td>1.1 hours/ 7 hours</td>
<td>Macrocytic anemia Neutropenia Nausea, vomiting, headache, insomnia, asthenia Nail pigmentation Lactic acidosis/severe hepatomegaly with hepatic steatosis (this is a rare, but potentially life-threatening, toxicity) Hyperlipidemia Insulin resistance/diabetes mellitus Lipoatrophy Myopathy</td>
</tr>
</tbody>
</table>

**Note:** Generic product is available.
### Characteristics of Nucleoside Reverse Transcriptase Inhibitors

<table>
<thead>
<tr>
<th>Letter</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>a</td>
<td>For dose adjustments in patients with renal or hepatic insufficiency, see Appendix B, Table 10. When no food restriction is listed, the ARV drug can be taken with or without food.</td>
</tr>
<tr>
<td>b</td>
<td>Also see Table 17.</td>
</tr>
<tr>
<td>c</td>
<td>See Appendix B, Table 2 for information about these formulations.</td>
</tr>
<tr>
<td>d</td>
<td>See Appendix B, Table 1 for information about these formulations.</td>
</tr>
</tbody>
</table>

**Key:**
- 3TC = lamivudine
- ABC = abacavir
- BIC = bictegravir
- BMD = bone mineral density
- CrCl = creatinine clearance
- d4T = stavudine
- ddl = didanosine
- DOR = doravirine
- DRV/c = darunavir/cobicistat
- DTG = dolutegravir
- EC = enteric coated
- EFV = efavirenz
- EVG/c = elvitegravir/cobicistat
- FDC = fixed-dose combination
- FDA = Food and Drug Administration
- FTC = emtricitabine
- GAZT = azidothymidine glucuronide
- HBV = hepatitis B virus
- HLA = human leukocyte antigen
- HSR = hypersensitivity reaction
- IV = intravenous
- MI = myocardial infarction
- RPV = rilpivirine
- STR = single-tablet regimen
- TAF = tenofovir alafenamide
- TDF = tenofovir disoproxil fumarate
- WHO = World Health Organization
- ZDV = zidovudine