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

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### Appendix B, Table 1. Characteristics of Nucleoside Reverse Transcriptase Inhibitors

(Updated October 25, 2018; last reviewed October 25, 2018)

<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>
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<tbody>
<tr>
<td><strong>Abacavir</strong> (ABC) <strong>Ziagen</strong></td>
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</tbody>
</table>
| **Note:** Generic tablet formulation is available. |            | **Ziagen:**  | • 300 mg tablet  
• 20 mg/mL oral solution | Metabolized by alcohol dehydrogenase and glucuronyl transferase  
Renal excretion of metabolites: 82%  
Dose adjustment for ABC is recommended in patients with hepatic insufficiency (see Appendix B, Table 8). | 1.5 hours/12–26 hours | • HSRs: Patients who test positive for HLA-B*5701 are at highest risk. HLA screening should be done before initiation of ABC.  
• For patients with a history of HSR, re challenge is not recommended.  
• Symptoms of HSR may include fever, rash, nausea, vomiting, diarrhea, abdominal pain, malaise, fatigue, or respiratory symptoms such as sore throat, cough, or shortness of breath.  
• Some cohort studies suggest increased risk of MI with recent or current use of ABC, but this risk is not substantiated in other studies.  
• Insulin resistance/diabetes mellitus |
| **Note:** |            | **Epzicom:**  | • (ABC 600 mg plus 3TC 300 mg) tablet  
• 1 tablet once daily | | | |
| **Epzicom** (ABC/3TC) | | **Triumeq:**  | • (ABC 600 mg plus 3TC 300 mg plus DTG 50 mg) tablet  
• 1 tablet once daily | | | |
| **Note:** Generic formulation is available. | | **Trizivir:**  | • (ABC 300 mg plus ZDV 300 mg plus 3TC 150 mg) tablet  
• 1 tablet BID | | | |
| **Didanosine** (ddl) **Videx** **Videx EC** | | **Videx EC:**  | • 125, 200, 250, and 400 mg capsules  
• 10 mg/mL oral solution | Body Weight ≥60 kg:  
• ddl 400 mg once daily  
*With TDF:*  
• ddl 250 mg once daily  
Body Weight <60 kg:  
• ddl 250 mg once daily  
*With TDF:*  
• ddl 200 mg once daily  
Take 1/2 hour before or 2 hours after a meal.  
**Note:** Preferred dosing with oral solution is BID (with the total daily dose divided into 2 doses). | Renal excretion: 50%  
Dose adjustment is recommended in patients with renal insufficiency (see Appendix B, Table 8). | 1.5 hours/20 hours | • Pancreatitis  
• Peripheral neuropathy  
• Retinal changes, optic neuritis  
• Lactic acidosis with hepatic steatosis with or without pancreatitis (rare but potentially life-threatening toxicity)  
• Nausea, vomiting  
• Potential association with noncirrhotic portal hypertension; in some cases, patients presented with esophageal varices  
• One cohort study suggested increased risk of MI with recent or current use of ddl, but this risk is not substantiated in other studies.  
• Insulin resistance/diabetes mellitus |
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<th>Adverse Eventsᵇ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emtricitabine (FTC) Emtriva</td>
<td>Emtriva: <strong>• 200 mg hard gelatin capsule</strong>  <strong>• 10 mg/mL oral solution</strong></td>
<td>Emtriva: Capsule: <strong>• FTC 200 mg once daily</strong> Oral Solution: <strong>• FTC 240 mg (24 mL) once daily</strong></td>
<td>Renal excretion: 86% Dose adjustment is recommended in patients with renal insufficiency (see Appendix B, Table 8).</td>
<td>10 hours/ &gt;20 hours</td>
<td>• Minimal toxicity  • Hyperpigmentation/skin discoloration  • Severe acute exacerbation of hepatitis may occur in HBV coinfected patients who discontinue FTC.</td>
<td></td>
</tr>
<tr>
<td>(FTC/TAF) Descovy</td>
<td>Descovy: <strong>• (FTC 200 mg plus TAF 25 mg) tablet</strong></td>
<td>Descovy: <strong>• 1 tablet once daily</strong></td>
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<td></td>
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</tr>
<tr>
<td>(FTC/TDF) Truvada</td>
<td>Truvada: <strong>• (FTC 200 mg plus TDF 300 mg) tablet</strong></td>
<td>Truvada: <strong>• 1 tablet once daily</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(FTC/BIC/TAF) Biktarvy</td>
<td>Biktarvy: <strong>• (FTC 200 mg plus BIC 50 mg plus TAF 25 mg) tablet</strong></td>
<td>Biktarvy: <strong>• 1 tablet once daily</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(FTC/DRV/c/TAF) Symtuza</td>
<td>Symtuza: <strong>• (FTC 200 mg plus DRV 800 mg plus COBI 150 mg plus TAF 10 mg) tablet</strong></td>
<td>Symtuza: <strong>• 1 tablet once daily with food</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(FTC/EFV/TDF) Atripla</td>
<td>Atripla: <strong>• (FTC 200 mg plus EFV 600 mg plus TDF 300 mg) tablet</strong></td>
<td>Atripla: <strong>• 1 tablet once daily on an empty stomach, preferably at bedtime</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(FTC/EVG/c/TAF) Genvoya</td>
<td>Genvoya: <strong>• (FTC 200 mg plus EVG 150 mg plus COBI 150 mg plus TAF 10 mg) tablet</strong></td>
<td>Genvoya: <strong>• 1 tablet once daily with food</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(FTC/EVG/c/TDF) Stribild</td>
<td>Stribild: <strong>• (FTC 200 mg plus EVG 150 mg plus COBI 150 mg plus TDF 300 mg) tablet</strong></td>
<td>Stribild: <strong>• 1 tablet once daily with food</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(FTC/RPV/TDF) Complera</td>
<td>Complera: <strong>• (FTC 200 mg plus RPV 25 mg plus TDF 300 mg) tablet</strong></td>
<td>Complera: <strong>• 1 tablet once daily with a meal</strong></td>
<td></td>
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</tr>
</tbody>
</table>
### Appendix B, Table 1. Characteristics of Nucleoside Reverse Transcriptase Inhibitors *(Last updated October 25, 2018; last reviewed October 25, 2018)*

<table>
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<tr>
<th>Generic Name (Abbreviation) Trade Name</th>
<th>Formulations</th>
<th>Dosing Recommendationsa</th>
<th>Elimination/ Metabolic Pathway</th>
<th>Serum/ Intracellular Half-Lives</th>
<th>Adverse Eventsb</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lamivudine (3TC) Epivir</td>
<td>Epivir:</td>
<td>Epivir:</td>
<td>Renal excretion: 70%</td>
<td>5–7 hours/ 18–22 hours</td>
<td>• Minimal toxicity</td>
</tr>
<tr>
<td>Note: Generic is available.</td>
<td>• 150 and 300 mg tablets</td>
<td>• 3TC 300 mg once daily, or 3TC 150 mg BID</td>
<td></td>
<td></td>
<td>• Severe acute exacerbation of hepatitis may occur in HBV coinfected patients who discontinue 3TC.</td>
</tr>
<tr>
<td>(3TC/ABC) Epzicom</td>
<td>Epzicom:</td>
<td>Epzicom:</td>
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<td></td>
</tr>
<tr>
<td>Note: Generic is available.</td>
<td>• (3TC 300 mg plus ABC 600 mg) tablet</td>
<td>• 1 tablet once daily</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3TC/TDF) Cimduo</td>
<td>Cimduo:</td>
<td>Cimduo:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3TC/ZDV) Combivir</td>
<td>Combivir:</td>
<td>Combivir:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note: Generic is available.</td>
<td>• (3TC 150 mg plus ZDV 300 mg) tablet</td>
<td>• 1 tablet BID</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(3TC/ABC/ZDV) Trizivir</td>
<td>Trizivir:</td>
<td>Trizivir:</td>
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</tr>
<tr>
<td>Note: Generic is available.</td>
<td>• (3TC 150 mg plus ZDV 300 mg plus ABC 300 mg) tablet</td>
<td>• 1 tablet BID</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3TC/DOR/TDF) Delstrigo</td>
<td>Delstrigo:</td>
<td>Delstrigo:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3TC/DTG/ABC) Triumeq</td>
<td>Triumeq:</td>
<td>Triumeq:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Note: Generic is available.</td>
<td>• (3TC 300 mg plus DTG 100 mg plus TDF 300 mg) tablet</td>
<td>• 1 tablet once daily</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3TC/EFV/TDF) Symfi</td>
<td>Symfi:</td>
<td>Symfi:</td>
<td>1 tablet once daily on an empty stomach, preferably at bedtime</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3TC/EFV/TDF) Symfi Lo</td>
<td>Symfi Lo:</td>
<td>Symfi Lo:</td>
<td>1 tablet once daily on an empty stomach, preferably at bedtime</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Appendix B, Table 1. Characteristics of Nucleoside Reverse Transcriptase Inhibitors  
(Listed updated October 25, 2018; last reviewed October 25, 2018)  
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</table>
| **Stavudine (d4T) Zerit** Note: Generic is available. | Zerit:  
• 15, 20, 30, and 40 mg capsules  
• 1 mg/mL oral solution | Body Weight ≥60 kg:  
• d4T 40 mg BID  
Body Weight <60 kg:  
• d4T 30 mg BID  
Take without regard to meals.  
Note: WHO recommends 30 mg BID dosing regardless of body weight. | Renal excretion: 50%  
Dose adjustment is recommended in patients with renal insufficiency (see Appendix B, Table 8). | 1 hour/ 7.5 hours | • Peripheral neuropathy  
• Lipoatrophy  
• Pancreatitis  
• Lactic acidosis/severe hepatomegaly with hepatic steatosis (rare but potentially life-threatening toxicity)  
• Hyperlipidemia  
• Insulin resistance/diabetes mellitus  
• Rapidly progressive ascending neuromuscular weakness (rare) |
| **Tenofovir Alafenamide (TAF) Vemlidy** Note: Available as a 25-mg tablet for the treatment of HBV. | See FDCs for HIV treatment below. | See FDCs for HIV treatment below. | Metabolized by cathepsin A.  
Not recommended in patients with CrCl <30 mL/min. | 0.5 hours/ 150–180 hours | • Renal insufficiency, Fanconi syndrome, proximal renal tubulopathy are less likely to occur with TAF than with TDF.  
• Osteomalacia, decrease in bone mineral density are less likely to occur with TAF than with TDF.  
• Severe acute exacerbation of hepatitis may occur in HBV coinfected patients who discontinue TAF.  
• Diarrhea, nausea, headache |
| (FTC/TAF) Descovy | Descovy:  
• (FTC 200 mg plus TAF 25 mg) tablet | Descovy:  
• 1 tablet once daily | | | |
| (TAF/BIC/FTC) Biktarvy | Biktarvy:  
• (TAF 25 mg plus BIC 50 mg plus FTC 200 mg) tablet | Biktarvy:  
• 1 tablet once daily | | | |
| (TAF/DRV/c/FTC) Symtuza | Symtuza:  
• (TAF 10 mg plus DRV 800 mg plus COBI 150 mg plus FTC 200 mg) tablet | Symtuza:  
• 1 tablet once daily with food | | | |
| (TAF/EVG/c/FTC) Genvoya | Genvoya:  
• (TAF 10 mg plus EVG 150 mg plus COBI 150 mg plus FTC 200 mg) tablet | Genvoya:  
• 1 tablet once daily with food | | | |
| (TAF/RPV/FTC) Odefsey | Odefsey:  
• (TAF 25 mg plus RPV 25 mg plus FTC 200 mg) tablet | Odefsey:  
• 1 tablet once daily with a meal | | | |
<table>
<thead>
<tr>
<th>Generic Name (Abbreviation)</th>
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<th>Formulations</th>
<th>Dosing Recommendations (^a)</th>
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<th>Serum/ Intracellular Half-Lives</th>
<th>Adverse Events (^b)</th>
</tr>
</thead>
</table>
| Tenofovir Disoproxil Fumarate (TDF) | Viread | Viread:  
• 150, 200, 250, and 300 mg tablets  
• 40 mg/g oral powder  
Generic:  
• 300 mg tablet | Viread:  
• TDF 300 mg once daily, or  
• 7.5 level scoops of oral powder once daily (dosing scoop dispensed with each prescription; 1 level scoop contains 1g of oral powder).  
• Take without regard to meals.  
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.** | Renal excretion is primary route of elimination.  
Dose adjustment is recommended in patients with renal insufficiency (see Appendix B, Table 8). | 17 hours/ >60 hours |  
• Renal insufficiency, Fanconi syndrome, proximal renal tubulopathy  
• Osteomalacia, decrease in bone mineral density  
• Severe acute exacerbation of hepatitis may occur in HBV-coinfected patients who discontinue TDF.  
• Asthenia, headache, diarrhea, nausea, vomiting, and flatulence |
| (TDF/3TC) | Cimduo | (TDF 300 mg plus 3TC 300 mg) tablet | Cimduo:  
• 1 tablet once daily | | | |
| (TDF/FTC) | Truvada | (TDF 300 mg plus FTC 200 mg) tablet | Truvada:  
• 1 tablet once daily  
• Take without regard to meals. | | | |
| (TDF/DOR/3TC) | Delstrigo | (TDF 300 mg plus DOR 100 mg plus 3TC 300 mg) tablet | Delstrigo:  
• 1 tablet once daily | | | |
| (TDF/EFV/FTC) | Atripla | (TDF 300 mg plus EFV 600 mg plus FTC 200 mg) tablet | Atripla:  
• 1 tablet once daily on an empty stomach, preferably at bedtime | | | |
| (TDF/EFV/3TC) | Symfi | (TDF 300 mg plus EFV 600 mg plus 3TC 300 mg) tablet | Symfi:  
• 1 tablet once daily on an empty stomach, preferably at bedtime | | | |
| (TDF/EFV/3TC) | Symfi Lo | (TDF 300 mg plus EFV 400 mg plus 3TC 300 mg) tablet | Symfi Lo:  
• 1 tablet once daily on an empty stomach, preferably at bedtime | | | |
| (TDF/EVG/c/ FTC) | Stribild | (TDF 300 mg plus EVG 150 mg plus COBI 150 mg plus FTC 200 mg) tablet | Stribild:  
• 1 tablet once daily  
• Take with food. | | | |
| (TDF/RPV/FTC) | Complera | (TDF 300 mg plus RPV 25 mg plus FTC 200 mg) tablet | Complera:  
• 1 tablet once daily  
• Take with a meal. | | | |
### Appendix B, Table 1. Characteristics of Nucleoside Reverse Transcriptase Inhibitors  *(Last updated October 25, 2018; last reviewed October 25, 2018)*  

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<tr>
<td>Zidovudine (ZDV) <em>Retrovir</em> <strong>Note:</strong> Generic is available.</td>
<td><strong>Retrovir:</strong> 100 mg capsule; 300 mg tablet (only available as generic); 10 mg/mL intravenous solution; 10 mg/mL oral solution</td>
<td><strong>Retrovir:</strong> 300 mg BID, or 200 mg TID; Take without regard to meals.</td>
<td>Metabolized to GAZT; Renal excretion of GAZT; Dose adjustment is recommended in patients with renal insufficiency (see Appendix B, Table 8).</td>
<td>1.1 hours/7 hours</td>
<td>• Bone marrow suppression: macrocytic anemia or neutropenia; • Nausea, vomiting, headache, insomnia, asthenia; • Nail pigmentation; • Lactic acidosis/severe hepatomegaly with hepatic steatosis (rare but potentially life-threatening toxicity); • Hyperlipidemia; • Insulin resistance/diabetes mellitus; • Lipoatrophy; • Myopathy</td>
</tr>
<tr>
<td>(ZDV/3TC) <em>Combivir</em> <strong>Note:</strong> Generic is available.</td>
<td><strong>Combivir:</strong> (ZDV 300 mg plus 3TC 150 mg) tablet</td>
<td><strong>Combivir:</strong> 1 tablet BID; Take without regard to meals.</td>
<td></td>
<td>1.1 hours/7 hours</td>
<td></td>
</tr>
<tr>
<td>(ZDV/3TC/ABC) <em>Trizivir</em> <strong>Note:</strong> Generic is available.</td>
<td><strong>Trizivir:</strong> (ZDV 300 mg plus 3TC 150 mg plus ABC 300 mg) tablet</td>
<td><strong>Trizivir:</strong> 1 tablet BID; Take without regard to meals.</td>
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</tr>
</tbody>
</table>

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*a* For dose adjustments in patients with renal or hepatic insufficiency, see Appendix B, Table 8.

*b* Also see Table 15.

**Key to Acronyms:** 3TC = lamivudine; ABC = abacavir; BIC = bictegravir; BID = twice daily; COBI = cobicistat; CrCl = creatinine clearance; d4T = stavudine; ddl = didanosine; DOR = doravirine; DRV = darunavir; DTG = dolutegravir; EC = enteric coated; EFV = efavirenz; EVG = elvitegravir; FDC = fixed-dose combination; FTC = emtricitabine; GAZT = azidothymidine glucuronide; HBV = hepatitis B virus; HLA = human leukocyte antigen; HSR = hypersensitivity reaction; MI = myocardial infarction; RPV = rilpivirine; TAF = tenofovir alafenamide; TDF = tenofovir disoproxil fumarate; TID = three times a day; WHO = World Health Organization; ZDV = zidovudine