The older PIs FPV, IDV, NFV, SQV, and TPV 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 information regarding these drugs.

### Table 5. Characteristics of Protease Inhibitors

<table>
<thead>
<tr>
<th>Generic Name (Abbreviations)</th>
<th>Formulations</th>
<th>Dosing Recommendations</th>
<th>Elimination/ Metabolic Pathway</th>
<th>Serum Half-Life</th>
<th>Adverse Events</th>
</tr>
</thead>
</table>
| Atazanavir (ATV) Reyataz (ATV/c) Evotaz | Reyataz: • 150, 200, and 300 mg capsules • 50 mg oral powder/packet **Generic:** • 100, 150, 200, and 300 mg capsules **Evotaz:** • ATV 300 mg/COBI 150 mg tablet | **Reyataz**  
*In ARV-Naive Patients:*  
• (ATV 300 mg plus RTV 100 mg) once daily; or  
• ATV 400 mg once daily  
• Take with food.  
*With TDF or in ARV-Experienced Patients:*  
• (ATV 300 mg plus RTV 100 mg) once daily  
• Unboosted ATV is not recommended.  
• Take with food.  
*With EFV in ARV-Naive Patients:*  
• (ATV 400 mg plus RTV 100 mg) once daily  
• Take with food.  
**Evotaz:**  
• One tablet once daily  
• Take with food.  
• The use of ATV/c is not recommended for patients who are taking TDF and who have baseline CrCl <70 mL/min (see Appendix B, Table 10 for the equation for calculating CrCl).  
For dosing recommendations for patients who are also receiving H2 antagonists and PPIs, refer to Table 21a. | **ATV:**  
• CYP3A4 inhibitor and substrate  
• Weak CYP2C8 inhibitor  
• UGT1A1 inhibitor  
**COBI:**  
• CYP3A inhibitor and substrate  
• CYP2D6 inhibitor  
Dose adjustment is recommended in patients with hepatic insufficiency (see Appendix B, Table 10). | 7 hours | Indirect hyperbilirubinemia  
PR interval prolongation. First degree symptomatic AV block has been reported. Use with caution in patients who have underlying conduction defects or who are on concomitant medications that can cause PR prolongation.  
Cholelithiasis  
Nephrolithiasis  
Renal insufficiency  
Serum transaminase elevations  
Hyperlipidemia (especially with RTV boosting)  
Skin rash  
Hyperglycemia  
Fat maldistribution  
An increase in serum creatinine may occur when ATV is administered with COBI.
Appendix B, Table 5. Characteristics of Protease Inhibitors *(Last updated December 18, 2019; last reviewed December 18, 2019)*  

<table>
<thead>
<tr>
<th>Generic Name (Abbreviations)</th>
<th>Trade Name</th>
<th>Formulations</th>
<th>Dosing Recommendationsa</th>
<th>Elimination/Metabolic Pathway</th>
<th>Serum Half-Life</th>
<th>Adverse Eventsb</th>
</tr>
</thead>
</table>
| Darunavir (DRV)              | Prezista   | Prezista:    | In ARV-Naive Patients or ARV-Experienced Patients with No DRV Mutations:  
• (DRV 800 mg plus RTV 100 mg) once daily  
• Take with food.  
In ARV-Experienced Patients with One or More DRV Resistance Mutations:  
• (DRV 600 mg plus RTV 100 mg) twice daily  
• Take with food.  
Unboosted DRV **is not recommended**.  
Prezobix:  
• One tablet once daily  
• Take with food.  
• **Not recommended** for patients with one or more DRV resistance-associated mutations.  
• Coadministering Prezobix and TDF **is not recommended** for patients with baseline CrCl <70 mL/min (see Appendix B, Table 10 for the equation for calculating CrCl).  
See Appendix B, Table 1 for dosing information for Symtuza. | DRV:  
• CYP3A4 inhibitor and substrate  
• CYP2C9 inducer  
COBI:  
• CYP3A inhibitor and substrate  
• CYP2D6 inhibitor | 15 hours when combined with RTV  
7 hours when combined with COBI | **Skin Rash:** DRV has a sulfonamide moiety, however incidence and severity of rash are similar in those with or without a sulfonamide allergy; Stevens-Johnson syndrome, toxic epidermal necrolysis, acute generalized exanthematous pustulosis, and erythema multiforme have been reported.  
Hepatotoxicity  
Diarrhea, nausea  
Headache  
Hyperlipidemia  
Serum transaminase elevation  
Hyperglycemia  
Fat maldistribution  
An increase in serum creatinine may occur when DRV is administered with COBI. |
| Prezista (DRV/c)             | Prezcobix  | Prezista:  
• 75, 150, 600, and 800 mg tablets  
• 100 mg/mL oral suspension  
Prezcobix:  
• DRV 800 mg/COBI 150 mg tablet  
Also available as part of the STR Symtuza (DRV/c/TAF/FTC) | | | | |
## Appendix B, Table 5. Characteristics of Protease Inhibitors

*Last updated December 18, 2019; last reviewed December 18, 2019*

<table>
<thead>
<tr>
<th>Generic Name (Abbreviations)</th>
<th>Formulations</th>
<th>Dosing Recommendations</th>
<th>Elimination/Metabolic Pathway</th>
<th>Serum Half-Life</th>
<th>Adverse Events</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lopinavir/ Ritonavir</strong> (LPV/r) <strong>Kaletra</strong></td>
<td>Kaletra:  - LPV/r 200 mg/50 mg tablets  - LPV/r 100 mg/25 mg tablets  - LPV/r 400 mg/100 mg per 5 mL of oral solution. Oral solution contains 42% alcohol.</td>
<td>Kaletra:  - LPV/r 400 mg/100 mg twice daily, or  - LPV/r 800 mg/200 mg once daily. However, once-daily dosing is <strong>not recommended</strong> for patients with three or more LPV-associated mutations, pregnant women, or patients receiving EFV, NVP, carbamazepine, phenytoin, or phenobarbital. <em>With EFV or NVP in PI-Naive or PI Experienced Patients:</em>  - LPV/r 500 mg/125 mg tablets twice daily (use a combination of two LPV/r 200 mg/50 mg tablets plus one LPV/r 100 mg/25 mg tablet to make a total dose of LPV/r 500 mg/125 mg), or  - LPV/r 533 mg/133 mg oral solution twice daily</td>
<td>CYP3A4 inhibitor and substrate</td>
<td>5–6 hours</td>
<td>GI intolerance, nausea, vomiting, diarrhea  Pancreatitis  Asthenia  Hyperlipidemia  (especially hypertriglyceridemia)  Serum transaminase elevation  Hyperglycemia  Insulin resistance/diabetes mellitus  Fat maldistribution  Possible increase in the frequency of bleeding episodes in patients with hemophilia  PR interval prolongation  QT interval prolongation and Torsades de Pointes have been reported; however, causality could not be established.</td>
</tr>
<tr>
<td><strong>Ritonavir</strong> (RTV) <strong>Norvir</strong></td>
<td>Norvir:  - 100 mg tablet  - 100 mg soft gel capsule  - 80 mg/mL oral solution. Oral solution contains 43% alcohol.  - 100 mg single packet oral powder Also available as part of the FDC tablet Kaletra (LPV/r)</td>
<td>As a PK Booster (or Enhancer) for Other PIs:  - RTV 100–400 mg per day in one or two divided doses (refer to other PIs for specific dosing recommendations).</td>
<td>CYP3A4 &gt; 2D6 substrate  Potent CYP3A4 and 2D6 inhibitor  Inducer of UGT1A1 and CYPs 1A2, 2C8, 2C9, and 2C19</td>
<td>3–5 hours</td>
<td>GI intolerance, nausea, vomiting, diarrhea  Paresthesia (circumoral and extremities)  Hyperlipidemia  (especially hypertriglyceridemia)  Hepatitis  Asthenia  Taste perversion  Hyperglycemia  Fat maldistribution  Possible increase in the frequency of bleeding episodes in patients with hemophilia</td>
</tr>
</tbody>
</table>
Appendix B, Table 5. Characteristics of Protease Inhibitors *(Last updated December 18, 2019; last reviewed December 18, 2019)* (page 4 of 4)

* For dose adjustments in patients with hepatic insufficiency, see Appendix B, Table 10.
* Also see Table 17.

Key:
- **ARV** = antiretroviral
- **ATV** = atazanavir
- **ATV/c** = atazanavir/cobicistat
- **AV** = atrioventricular
- **COBI** = cobicistat
- **CrCl** = creatinine clearance
- **CYP** = cytochrome P
- **DRV** = darunavir
- **DRV/c** = darunavir/cobicistat
- **EFV** = efavirenz
- **FDA** = Food and Drug Administration
- **FDC** = fixed-dose combination
- **FPV** = fosamprenavir
- **FTC** = emtricitabine
- **GI** = gastrointestinal
- **IDV** = indinavir
- **LPV** = lopinavir
- **LPV/r** = lopinavir/ritonavir
- **msec** = millisecond
- **NFV** = nelfinavir
- **NVP** = nevirapine
- **PI** = protease inhibitor
- **PK** = pharmacokinetic
- **PPI** = proton pump inhibitor
- **RTV** = ritonavir
- **SQV** = saquinavir
- **STR** = single-tablet regimen
- **TAF** = tenofovir alafenamide
- **TDF** = tenofovir disoproxil fumarate
- **TPV** = tipranavir
- **UGT** = uridine diphosphate glucuronyl transferase