HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use ATAZANAVIR SULFATE safely and effectively. See full prescribing information for ATAZANAVIR SULFATE.

ATAZANAVIR SULFATE CAPSULES
Initial U.S. Approval: 2003

----------RECENT MAJOR CHANGES----------

Indications and Usage (1)	11/2009
Contraindications (4)	04/2010

----------INDICATIONS AND USAGE----------

Atazanavir sulfate is a protease inhibitor indicated for use in combination with other antiretroviral agents for the treatment of HIV-1 infection. (1)

----------DOSAGE AND ADMINISTRATION----------

- *Treatment-naive patients:* Atazanavir sulfate 300 mg with ritonavir 100 mg once daily with food or atazanavir sulfate 400 mg once daily with food. When coadministered with tenofovir, the recommended dose is atazanavir sulfate 300 mg with ritonavir 100 mg. (2.1)
- *Treatment-experienced patients:* Atazanavir sulfate 300 mg with ritonavir 100 mg once daily with food. (2.1)
- *Pediatric patients (6 to less than 18 years of age):* Dosage is based on body weight not to exceed the adult dose. (2.2)
- *Concomitant therapy:* Dosing modifications may be required. (2.1, 7)
- *Renal impairment:* Dosing modifications may be required. (2.3)
- *Hepatic impairment:* Dosing modifications may be required. (2.4)

----------DOSAGE FORMS AND STRENGTHS----------

- Capsules: 150 mg, and 300 mg. (3, 16)

---------- CONTRAINDICATIONS ----------

- Atazanavir sulfate is contraindicated in patients with previously demonstrated hypersensitivity (eg, Stevens-Johnson syndrome, erythema multiforme, or toxic skin eruptions) to any of the components of this product. (4)
- Coadministration with alfuzosin, triazolam, orally administered midazolam, ergot derivatives, rifampin, irinotecan, lovastatin, simvastatin, indinavir, cisapride, pimozide, St. John's wort, and sildenafil when dosed as REVATIO (4)

---------- WARNINGS AND PRECAUTIONS ----------

- *Cardiac conduction abnormalities:* PR interval prolongation may occur in some patients. Use with caution in patients with preexisting conduction system disease or when administered with other drugs that may prolong the PR interval. (5.2, 6.4, 7.3, 12.2, 17.3)
- *Rash:* Discontinue if severe rash develops. (5.3, 6.4, 17.4)
- *Hyperbilirubinemia:* Most patients experience asymptomatic increases in indirect bilirubin, which is reversible upon discontinuation. Do not dose reduce. If a concomitant transaminase increase occurs, evaluate for alternative etiologies. (5.4, 6.2)
- *Hepatotoxicity:* Patients with hepatitis B or C are at risk of increased transaminases or hepatic decompensation. Monitor liver function tests prior to therapy and during treatment. (2.4, 5.5, 6.3, 6.4, 8.8)
- *Nephrolithiasis* has been reported. Consider temporary interruption or discontinuation. (5.6, 6.4)
- Patients receiving atazanavir sulfate may develop new onset or exacerbations of diabetes mellitus/hyperglycemia (5.7, 6.4), immune reconstitution syndrome (5.8), and redistribution/accumulation of body fat. (5.9)
- *Hemophilia:* Spontaneous bleeding may occur and additional factor VIII may be required. (5.10)

---------- ADVERSE REACTIONS ----------

Most common adverse reactions (≥2%) are nausea, jaundice/scleral icterus, rash, headache, abdominal pain, vomiting, insomnia, peripheral neurologic symptoms, dizziness, myalgia, diarrhea, depression, and fever. (6.1, 6.2)

To report SUSPECTED ADVERSE REACTIONS, contact Matrix Laboratories at 1-877-446-3679 or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch

---------- DRUG INTERACTIONS ----------

Coadministration of atazanavir sulfate can alter the concentration of other drugs and other drugs may alter the concentration of atazanavir. The potential drug-drug interactions must be considered prior to and during therapy. (4, 5.1, 7, 12.3)

---------- USE IN SPECIFIC POPULATIONS ----------

- *Pregnancy:* Use only if the potential benefit justifies the potential risk to the fetus. Physicians are encouraged to register patients in the Antiretroviral Pregnancy registry by calling 1-800-258-4263. (8.1)
- *Nursing mothers* should be instructed not to breast-feed due to the potential for postnatal HIV transmission. (8.3)
- *Hepatitis B or C co-infection:* Monitor liver enzymes. (5.5, 6.3)
- *Renal impairment:* Do not use in treatment experienced patients with end stage renal disease managed with hemodialysis. (2.3, 8.7)
- *Hepatic impairment:* Do not use atazanavir sulfate in patients with severe hepatic impairment. Atazanavir sulfate/ritonavir is not recommended. (2.4, 8.8)

See 17 for PATIENT COUNSELING INFORMATION and FDA-approved patient labeling

August 2010

FULL PRESCRIBING INFORMATION CONTENTS*

*** Sections or subsections omitted from the full prescribing information are not listed**

Full Prescribing Information

1. INDICATIONS AND USAGE

Atazanavir sulfate is indicated in combination with other antiretroviral agents for the treatment of HIV-1 infection. This indication is based on analyses of plasma HIV-1 RNA levels and CD4+ cell counts from controlled studies of 96 weeks duration in antiretroviral-naive and 48 weeks duration in antiretroviral-treatment-experienced adult and pediatric patients at least 6 years of age.

The following points should be considered when initiating therapy with atazanavir sulfate:

- In Study AI424-045 atazanavir sulfate/ritonavir and lopinavir/ritonavir were similar for the primary efficacy outcome measure of time-averaged difference in change from baseline in HIV RNA level. This study was not large enough to reach a definitive conclusion that atazanavir sulfate/ritonavir and lopinavir/ritonavir are equivalent on the secondary efficacy outcome measure of proportions below the HIV RNA lower limit of detection [see *Clinical Studies (14.2)*].
- The number of baseline primary protease inhibitor mutations affects the virologic response to atazanavir sulfate/ritonavir [see *Clinical Pharmacology (12.4)*].

2. DOSAGE AND ADMINISTRATION

General Dosing Recommendations:

- Atazanavir sulfate capsules must be taken with food.
- The recommended oral dosage of atazanavir sulfate depends on the treatment history of the patient and the use of other coadministered drugs. When coadministered with H2-receptor antagonists or proton-pump inhibitors, dose separation may be required [see *Dosage and Administration (2.1)*].
- When coadministered with didanosine buffered or enteric-coated formulations, atazanavir sulfate should be given (with food) 2 hours before or 1 hour after didanosine.
- Atazanavir sulfate without ritonavir is not recommended for treatment-experienced patients with prior virologic failure [see *Clinical Studies (14)*].
- Efficacy and safety of atazanavir sulfate with ritonavir in doses greater than 100 mg once daily have not been established. The use of higher ritonavir doses might alter the safety profile of atazanavir (cardiac effects, hyperbilirubinemia) and, therefore, is not recommended. Prescribers should consult the complete prescribing information for NORVIR® (ritonavir) when using this agent.

2.1 Recommended Adult Dosage

Dose Recommendations for Therapy-Naive Patients

- For treatment-naive patients, the recommended dosage is atazanavir sulfate 300 mg with ritonavir 100 mg once daily (all as a single dose with food).

OR

- For treatment-naive patients who are unable to tolerate ritonavir, the recommended dosage is atazanavir sulfate 400 mg (without ritonavir) once daily taken with food.

Concomitant Therapy:

- Atazanavir sulfate 300 mg with ritonavir 100 mg once daily (all as a single dose with food) if combined with any of the following:
- tenofovir
- H_2-receptor antagonist: The H_2-receptor antagonist dose should not exceed a dose comparable to famotidine 40 mg twice daily. Atazanavir sulfate 300 mg and ritonavir 100 mg should be administered simultaneously with, and/or at least 10 hours after, the dose of the H_2-receptor antagonist. For patients unable to tolerate ritonavir, atazanavir sulfate 400 mg once daily with food should be administered at least 2 hours before and at least 10 hours after the H_2-receptor antagonist. For these patients, no single dose of the H_2-receptor antagonist should exceed a dose comparable to famotidine 20 mg, and the total daily dose should not exceed a dose comparable to famotidine 40 mg.
- proton-pump inhibitors: The proton-pump inhibitor dose should not exceed a dose comparable to omeprazole 20 mg and must be taken approximately 12 hours prior to the atazanavir sulfate 300 mg and ritonavir 100 mg dose.
- If atazanavir sulfate is combined with efavirenz, atazanavir sulfate 400 mg (two 200-mg capsules) with ritonavir 100 mg should be administered once daily all as a single dose with food, and efavirenz should be administered on an empty stomach, preferably at bedtime.

Dose Recommendations for Therapy-Experienced Patients

Atazanavir sulfate 300 mg with ritonavir 100 mg once daily (all as a single dose with food).

Concomitant Therapy:

- Whenever an H_2-receptor antagonist is given to a patient receiving atazanavir sulfate with ritonavir, the H_2-receptor antagonist dose should not exceed a dose comparable to famotidine 20 mg twice daily, and the atazanavir sulfate and ritonavir doses should be administered simultaneously with, and/or at least 10 hours after, the dose of the H_2-receptor antagonist.
  - Atazanavir sulfate 300 mg with ritonavir 100 mg once daily (all as a single dose with food) if taken with an H_2-receptor antagonist.
  - Atazanavir sulfate 400 mg (two 200-mg capsules) with ritonavir 100 mg once daily (all as a single dose with food) if taken with both tenofovir and an H_2-receptor antagonist.
- Proton-pump inhibitors should not be used in treatment-experienced patients receiving atazanavir sulfate.
- Efavirenz: Do not coadminister atazanavir sulfate with efavirenz in treatment-experienced patients due to decreased atazanavir exposure.

[For these drugs and other antiretroviral agents for which dosing modification may be appropriate, see *Drug Interactions (7)*.]

2.2 Recommended Pediatric Dosage

The recommended dosage of atazanavir sulfate for pediatric patients (6 to less than 18 years of age) is based on body weight and should not exceed the recommended adult dosage. Atazanavir sulfate Capsules must be taken with food. The data are insufficient to recommend dosing of atazanavir sulfate for any of the following: (1) patients less than 6 years of age, (2) without ritonavir in patients less than 13 years of age, and (3) treatment-experienced pediatric patients with body weight less than 25 kg.

Therapy-Naive Pediatric Patients

The recommended dosage of atazanavir sulfate with ritonavir in treatment-naive patients at least 6 years of age is shown in Table 1.

For treatment-naive patients at least 13 years of age and at least 39 kg, who are unable to tolerate ritonavir, the recommended dose is atazanavir sulfate 400 mg (without ritonavir) once daily with food.

Table 1: Dosage for Treatment-Naive Pediatric Patients (6 to less than 18 years of age) for Atazanavir Sulfate Capsules with ritonavir

Body Weight (kg)	Body Weight (lbs)	Atazanavir sulfate dose[a,b] (mg)	ritonavir dose[b] (mg)
15 to less than 25	33 to less than 55	150	80[c]
25 to less than 32	55 to less than 70	200	100[d]
32 to less than 39	70 to less than 86	250	100[d]
at least 39	at least 86	300	100[d]

a. The recommended dosage of atazanavir sulfate can be achieved using a combination of commercially available capsule strengths.
b. The dosage of atazanavir sulfate and ritonavir was calculated as follows:
- 15 kg to less than 20 kg: Atazanavir sulfate 8.5 mg/kg with ritonavir 4 mg/kg once daily with food.
- at least 20 kg: atazanavir sulfate 7 mg/kg with ritonavir 4 mg/kg once daily with food not to exceed atazanavir sulfate 300 mg and ritonavir 100 mg.

c. Ritonavir liquid.
d. Ritonavir capsule or liquid.

Therapy-Experienced Pediatric Patients

The recommended dosage of atazanavir sulfate with ritonavir in treatment-experienced patients at least 6 years of age is shown in Table 2.

Table 2: Dosage for Treatment-Experienced Pediatric Patients (6 to less than 18 years of age) for Atazanavir Sulfate Capsules with ritonavir

Body Weight (kg)	Body Weight (lbs)	Atazanavir sulfate dose[a,b] (mg)	ritonavir dose[b] (mg)
25 to less than 32	55 to less than 70	200	100[c]
32 to less than 39	70 to less than 86	250	100[c]
at least 39	at least 86	300	100[c]

a. The recommended dosage of atazanavir sulfate can be achieved using a combination of commercially available capsule strengths.
b. The dosage was calculated as atazanavir sulfate 7 mg/kg with ritonavir 4 mg/kg once daily with food not to exceed atazanavir sulfate 300 mg and ritonavir 100 mg.
c. Ritonavir capsule or liquid.

2.3 Renal Impairment

For patients with renal impairment, including those with severe renal impairment who are not managed with hemodialysis, no dose adjustment is required for atazanavir sulfate. Treatment-naive patients with end stage renal disease managed with hemodialysis should receive atazanavir sulfate 300 mg with ritonavir 100 mg. Atazanavir sulfate should not be administered to HIV-treatment-experienced patients with end stage renal disease managed with hemodialysis. [See *Use in Specific Populations (8.7)*.]

2.4 Hepatic Impairment

Atazanavir sulfate should be used with caution in patients with mild-to-moderate hepatic impairment. For patients with moderate hepatic impairment (Child-Pugh Class B) who have not experienced prior virologic failure, a dose reduction to 300 mg once daily should be considered. Atazanavir sulfate should not be used in patients with severe hepatic impairment (Child-Pugh Class C). Atazanavir sulfate/ritonavir has not been studied in subjects with hepatic impairment and is not recommended. [See *Warnings and Precautions (5.5)* and *Use in Specific Populations (8.8)*.]

3. DOSAGE FORMS AND STRENGTHS

- 150 mg capsule with light sky blue opaque color cap and light sky blue opaque color body imprinted with "M166" on both cap and body in black ink.
- 300 mg capsule with blue opaque color cap and light sky blue opaque color body imprinted with "M167" on both cap and body in black ink

4. CONTRAINDICATIONS

Atazanavir sulfate is contraindicated:

- in patients with previously demonstrated clinically significant hypersensitivity (eg, Stevens-Johnson syndrome, erythema multiforme, or toxic skin eruptions) to any of the components of this product.
- when coadministered with drugs that are highly dependent on CYP3A or UGT1A1 for clearance, and for which elevated plasma concentrations are associated with serious and/or life-threatening events. These and other contraindicated drugs are listed in Table 3.

Table 3: Drugs That Are Contraindicated with Atazanavir sulfate

Drug class	Drugs within class that are contraindicated with atazanavir sulfate	Clinical Comment
Alpha 1-adrenoreceptor antagonist	Alfuzosin	Potential for increased alfuzosin concentrations, which can result in hypotension.
Antimycobacterials	Rifampin	Rifampin substantially decreases plasma concentrations of atazanavir, which may result in loss of therapeutic effect and development of resistance.
Antineoplastics	Irinotecan	Atazanavir inhibits UGT1A1 and may interfere with the metabolism of irinotecan, resulting in increased irinotecan toxicities.
Benzodiazepines	Triazolam, orally administered midazolam[a]	Triazolam and orally administered midazolam are extensively metabolized by CYP3A4. Coadministration of triazolam or orally administered midazolam with atazanavir sulfate may cause large increases in the concentration of these benzodiazepines. Potential for serious and/or life-threatening events such as prolonged or increased sedation or respiratory depression.
Ergot Derivatives	Dihydroergotamine, ergotamine, ergonovine, methylergonovine	Potential for serious and/or life-threatening events such as acute ergot toxicity characterized by peripheral vasospasm and ischemia of the extremities and other tissues.
GI Motility Agent	Cisapride	Potential for serious and/or life-threatening reactions such as cardiac arrhythmias.
Herbal Products	St. John's wort *(Hypericum perforatum)*	Patients taking atazanavir sulfate should not use products containing St. John's wort because coadministration may be expected to reduce plasma concentrations of atazanavir. This may result in loss of therapeutic effect and development of resistance.
HMG-CoA Reductase Inhibitors	Lovastatin, simvastatin	Potential for serious reactions such as myopathy including rhabdomyolysis.
Neuroleptic	Pimozide	Potential for serious and/or life-threatening reactions such as cardiac arrhythmias.
PDE5 inhibitor	Sildenafil[b] when dosed as REVATIO® for the treatment of pulmonary arterial hypertension	A safe and effective dose in combination with atazanavir sulfate has not been established for Sildenafil (REVATIO®) when used for the treatement of pulmonary hypertension. There is increased potential for Sildenafil-associated adverse events (which include visual disturbances, hypotension, priapism, and syncope).
Protease Inhibitors	Indinavir	Both atazanavir sulfate and indinavir are associated with indirect (unconjugated) hyperbilirubinemia.

a. See Drug Interactions, Table 13 (7) for parenterally administered midazolam.
b. See Drug Interactions, Table 13 (7) for Sildenafil when dosed as VIAGRA® for erectile dysfunction.

5. WARNINGS AND PRECAUTIONS

5.1 Drug Interactions

See Table 3 for a listing of drugs that are contraindicated for use with atazanavir sulfate due to potentially life-threatening adverse events, significant drug interactions, or loss of virologic activity. [See *Contraindications (4)*.] Please refer to Table 13 for established and other potentially significant drug interactions [see *Drug Interactions (7.3)*].

5.2 Cardiac Conduction Abnormalities

Atazanavir has been shown to prolong the PR interval of the electrocardiogram in some patients. In healthy volunteers and in patients, abnormalities in atrioventricular (AV) conduction were asymptomatic and generally limited to first-degree AV block. There have been rare reports of second-degree AV block and other conduction abnormalities [see *Adverse Reactions (6.4)* and *Overdosage (10)*]. In clinical trials that included electrocardiograms, asymptomatic first-degree AV block was observed in 5.9% of atazanavir-treated patients (n=920), 5.2% of lopinavir/ritonavir-treated patients (n=252), 10.4% of nelfinavir-treated patients (n=48), and 3.0% of efavirenz-treated patients (n=329). In Study AI424-045, asymptomatic first-degree AV block was observed in 5% (6/118) of atazanavir/ritonavir-treated patients and 5% (6/116) of lopinavir/ritonavir-treated patients who had on-study electrocardiogram measurements. Because of limited clinical experience in patients with preexisting conduction system disease (eg, marked first-degree AV block or second- or third-degree AV block), atazanavir should be used with caution in these patients. [See *Clinical Pharmacology (12.2)*.]

Atazanavir in combination with diltiazem increased diltiazem plasma concentration by 2-fold with an additive effect on the PR interval. When used in combination with atazanavir, a dose reduction of diltiazem by one half should be considered and ECG monitoring is recommended. In a pharmacokinetic study between atazanavir 400 mg once daily and atenolol 50 mg once daily, no clinically significant additive effect of atazanavir and atenolol on the PR interval was observed. Dose adjustment of atenolol is not required when used in combination with atazanavir. [See *Drug Interactions (7)* and *Clinical Pharmacology (12.2)*.] Pharmacokinetic studies between atazanavir and other drugs that prolong the PR interval including beta blockers [other than atenolol, see *Drug Interactions (7)*], verapamil, and digoxin have not been performed. An additive effect of atazanavir and these drugs cannot be excluded; therefore, caution should be exercised when atazanavir is given concurrently with these drugs, especially those that are metabolized by CYP3A (eg, verapamil).

5.3 Rash

In controlled clinical trials, rash (all grades, regardless of causality) occurred in approximately 20% of patients treated with atazanavir sulfate. The median time to onset of rash in clinical studies was 7.3 weeks and the median duration of rash was 1.4 weeks. Rashes were generally mild-to moderate maculopapular skin eruptions. Treatment-emergent adverse reactions of moderate or severe rash (occurring at a rate of ≥2%) are presented for the individual clinical studies [see *Adverse Reactions (6.1)*]. Dosing with atazanavir sulfate was often continued without interruption in patients who developed rash. The discontinuation rate for rash in clinical trials was <1%. Atazanavir sulfate should be discontinued if severe rash develops. Cases of Stevens-Johnson syndrome, erythema multiforme, and toxic skin eruptions have been reported in patients receiving atazanavir sulfate. [See *Contraindications (4)*.]

5.4 Hyperbilirubinemia

Most patients taking atazanavir sulfate experience asymptomatic elevations in indirect (unconjugated) bilirubin related to inhibition of UDP-glucuronosyl transferase (UGT). This hyperbilirubinemia is reversible upon discontinuation of atazanavir sulfate. Hepatic transaminase elevations that occur with hyperbilirubinemia should be evaluated for alternative etiologies. No long-term safety data are available for patients experiencing persistent elevations in total bilirubin >5 times ULN. Alternative antiretroviral therapy to atazanavir sulfate may be considered if jaundice or scleral icterus associated with bilirubin elevations presents cosmetic concerns for patients. Dose reduction of atazanavir is not recommended since long-term efficacy of reduced doses has not been established. [See *Adverse Reactions (6.1, 6.2)*.]

5.5 Hepatotoxicity

Caution should be exercised when administering atazanavir sulfate to patients with hepatic impairment because atazanavir concentrations may be increased. [See *Dosage and Administration (2.4)*.] Patients with underlying hepatitis B or C viral infections or marked elevations in transaminases before treatment may be at increased risk for developing further transaminase elevations or hepatic decompensation. In these patients, appropriate laboratory testing should be conducted prior to initiating therapy with atazanavir sulfate and these patients should be monitored during treatment. [See *Adverse Reactions (6.3)* and *Use in Specific Populations (8.8)*.]

5.6 Nephrolithiasis

Cases of nephrolithiasis were reported during postmarketing surveillance in HIV-infected patients receiving atazanavir sulfate therapy. Because these events were reported voluntarily during clinical practice, estimates of frequency cannot be made. If signs or symptoms of nephrolithiasis occur, temporary interruption or discontinuation of therapy may be considered. [See *Adverse Reactions (6.4)*.]

5.7 Diabetes Mellitus/Hyperglycemia

New-onset diabetes mellitus, exacerbation of preexisting diabetes mellitus, and hyperglycemia have been reported during postmarketing surveillance in HIV-infected patients receiving protease inhibitor therapy. Some patients required either initiation or dose adjustments of insulin or oral hypoglycemic agents for treatment of these events. In some cases, diabetic ketoacidosis has occurred. In those patients who discontinued protease inhibitor therapy, hyperglycemia persisted in some cases. Because these events have been reported voluntarily during clinical practice, estimates of frequency cannot be made and a causal relationship between protease inhibitor therapy and these events has not been established. [See *Adverse Reactions (6.4)*.]

5.8 Immune Reconstitution Syndrome

Immune reconstitution syndrome has been reported in patients treated with combination antiretroviral therapy, including atazanavir sulfate. During the initial phase of combination antiretroviral treatment, patients whose immune system responds may develop an inflammatory response to indolent or residual opportunistic infections (such as *Mycobacterium avium* infection, cytomegalovirus, *Pneumocystis jiroveci* pneumonia, or tuberculosis), which may necessitate further evaluation and treatment.

5.9 Fat Redistribution

Redistribution/accumulation of body fat including central obesity, dorsocervical fat enlargement (buffalo hump), peripheral wasting, facial wasting, breast enlargement, and "cushingoid appearance" have been observed in patients receiving antiretroviral therapy. The mechanism and long-term consequences of these events are currently unknown. A causal relationship has not been established.

5.10 Hemophilia

There have been reports of increased bleeding, including spontaneous skin hematomas and hemarthrosis, in patients with hemophilia type A and B treated with protease inhibitors. In some patients additional factor VIII was given. In more than half of the reported cases, treatment with protease inhibitors was continued or reintroduced. A causal relationship between protease inhibitor therapy and these events has not been established.

5.11 Resistance/Cross-Resistance

Various degrees of cross-resistance among protease inhibitors have been observed. Resistance to atazanavir may not preclude the subsequent use of other protease inhibitors. [See *Clinical Pharmacology (12.4)*.]

6. ADVERSE REACTIONS

The following adverse reactions are discussed in greater detail in other sections of the labeling:

- cardiac conduction abnormalities [see *Warnings and Precautions (5.2)*]
- rash [see *Warnings and Precautions (5.3)*]
- hyperbilirubinemia [see *Warnings and Precautions (5.4)*]
- nephrolithiasis [see *Warnings and Precautions (5.6)*]

Because clinical trials are conducted under widely varying conditions, adverse reactilon rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

6.1 Clinical Trial Experience in Adults

Treatment-Emergent Adverse Reactions in Treatment-Naive Patients

The safety profile of atazanavir sulfate in treatment-naive adults is based on 1625 HIV-1 infected patients in clinical trials. 536 patients received atazanavir sulfate 300 mg with ritonavir 100 mg and 1089 patients received atazanavir sulfate 400 mg or higher (without ritonavir).

The most common adverse reactions are nausea, jaundice/scleral icterus, and rash.

Selected clinical adverse reactions of moderate or severe intensity reported in ≥2% of treatment-naive patients receiving combination therapy including atazanavir sulfate 300 mg with ritonavir 100 mg and atazanavir sulfate 400 mg (without ritonavir) are presented in Tables 4 and 5, respectively.

Table 4: Selected Treatment-Emergent Adverse Reactionsa of Moderate or Severe Intensity Reported in ≥2% of Adult Treatment-Naive Patients,b Study AI424-138

	96 weeks[c] Atazanavir sulfate 300 mg with ritonavir 100 mg (once daily) and tenofovir with emtricitabine[d] (n=441)	96 weeks[c] lopinavir 400 mg with ritonavir 100 mg (twice daily) and tenofovir with emtricitabine[d] (n=437)
Digestive System		
Nausea	4%	8%
Jaundice/scleral icterus	5%	*
Diarrhea	2%	12%
Skin and Appendages		
Rash	3%	2%

* None reported in this treatment arm.
a. Includes events of possible, probable, certain, or unknown relationship to treatment regimen.
b. Based on the regimen containing atazanavir sulfate.
c. Median time on therapy.
d. As a fixed-dose combination: 300 mg tenofovir, 200 mg emtricitabine once daily.

Table 5: Selected Treatment-Emergent Adverse Reactions[a] of Moderate or Severe Intensity Reported in ≥2% of Adult Treatment-Naive Patients,[b] Studies AI424-034, AI424-007, and AI424-008

	Study AI424-034		Studies AI424-007, -008	
	64 weeks[c] Atazanavir sulfate 400 mg once daily + lamivudine + zidovudine[e] (n=404)	64 weeks[c] efavirenz 600 mg once daily + lamivudine + zidovudine[e] (n=401)	120 weeks[c,d] Atazanavir sulfate 400 mg once daily + stavudine + lamivudine or didanosine (n=279)	73 weeks[c,d] nelfinavir 750 mg TID or 1250 mg BID + stavudine + lamivudine or didanosine (n=191)
Body as a Whole				
Headache	6%	6%	1%	2%
Digestive System				
Nausea	14%	12%	6%	4%
Jaundice/scleral icterus	7%	*	7%	*
Vomiting	4%	7%	3%	3%
Abdominal pain	4%	4%	4%	2%
Diarrhea	1%	2%	3%	16%
Nervous System				
Insomnia	3%	3%	<1%	*
Dizziness	2%	7%	<1%	*
Peripheral neurologic symptoms	<1%	1%	4%	3%
Skin and Appendages				
Rash	7%	10%	5%	1%

* None reported in this treatment arm.
a. Includes events of possible, probable, certain, or unknown relationship to treatment regimen.
b. Based on regimens containing atazanavir sulfate.
c. Median time on therapy.
d. Includes long-term follow-up.
e. As a fixed-dose combination: 150 mg lamivudine, 300 mg zidovudine twice daily.

Treatment-Emergent Adverse Reactions in Treatment-Experienced Patients

The safety profile of atazanavir sulfate in treatment-experienced adults is based on 119 HIV-1 infected patients in clinical trials.

The most common adverse reactions are jaundice/scleral icterus and myalgia.

Selected clinical adverse reactions of moderate or severe intensity reported in ≥2% of treatment-experienced patients receiving atazanavir sulfate/ritonavir are presented in Table 6.

Table 6: Selected Treatment-Emergent Adverse Reactions[a] of Moderate or Severe Intensity Reported in ≥2% of Adult Treatment-Experienced Patients,[b] Study AI424-045

	48 weeks[c] Atazanavir sulfate/ritonavir 300/100 mg once daily + tenofovir + NRTI (n=119)	48 weeks[c] lopinavir/ritonavir 400/100 mg twice daily[d] + Tenofovir + NRTI (n=118)
Body as a Whole		
Fever	2%	*
Digestive System		
Jaundice/scleral icterus	9%	*
Diarrhea	3%	11%
Nausea	3%	2%
Nervous System		
Depression	2%	<1%
Musculoskeletal System		
Myalgia	4%	*

* None reported in this treatment arm.
a. Includes events of possible, probable, certain, or unknown relationship to treatment regimen.
b. Based on the regimen containing atazanavir sulfate.
c. Median time on therapy.
d. As a fixed-dose combination.

Laboratory Abnormalities in Treatment-Naive Patients

The percentages of adult treatment-naive patients treated with combination therapy including atazanavir sulfate 300 mg with ritonavir 100 mg and atazanavir sulfate 400 mg (without ritonavir) with Grade 3 to 4 laboratory abnormalities are presented in Tables 7 and 8, respectively.

Table 7: Grade 3 to 4 Laboratory Abnormalities Reported in ≥2% of Adult Treatment-Naive Patients,[a] Study AI424-138

Variable	Limit[c]	96 weeks[b] Atazanavir sulfate 300 mg with ritonavir 100 mg (once daily) and tenofovir with emtricitabine[d] (n=441)	96 weeks[b] lopinavir 400 mg with ritonavir 100 mg (twice daily) and tenofovir with emtricitabine[d] (n=437)
Chemistry	High		
SGOT/AST	≥5.1 x ULN	3%	1%
SGPT/ALT	≥5.1 x ULN	3%	2%
Total Bilirubin	≥2.6 x ULN	44%	<1%
Lipase	≥2.1 x ULN	2%	2%
Creatine Kinase	≥5.1 x ULN	8%	7%
Total Cholesterol	≥240 mg/dL	11%	25%
Hematology	Low		
Neutrophils	<750 cells/mm[3]	5%	2%

a. Based on the regimen containing atazanavir sulfate.
b. Median time on therapy.
c. ULN = upper limit of normal.
d. As a fixed-dose combination: 300 mg tenofovir, 200 mg emtricitabine once daily.

Table 8: Grade 3 to 4 Laboratory Abnormalities Reported in ≥2% of Adult Treatment-Naive Patients,a Studies AI424-034, AI424-007, and AI424-008

		Study AI424-034		Studies AI424-007, -008	
Variable	Limit[d]	64 weeks[b] Atazanavir sulfate 400 mg once daily + lamivudine + zidovudine[e] (n=404)	64 weeks[b] efavirenz 600 mg once daily + lamivudine + zidovudine[e] (n=401)	120 weeks[b,c] Atazanavir sulfate 400 mg once daily + stavudine + lamivudine or + stavudine + didanosine (n=279)	73 weeks[b,c] nelfinavir 750 mg TID or 1250 mg BID + stavudine + lamivudine or + stavudine + didanosine (n=191)
Chemistry	High				
SGOT/AST	≥5.1 x ULN	2%	2%	7%	5%
SGPT/ALT	≥5.1 x ULN	4%	3%	9%	7%
Total Bilirubin	≥2.6 x ULN	35%	<1%	47%	3%
Amylase	≥2.1 x ULN	*	*	14%	10%
Lipase	≥2.1 x ULN	<1%	1%	4%	5%
Creatine Kinase	≥5.1 x ULN	6%	6%	11%	9%
Total Cholesterol	≥240 mg/dL	6%	24%	19%	48%
Triglycerides	≥751 mg/dL	<1%	3%	4%	2%
Hematology	Low				
Hemoglobin	<8.0 g/dL	5%	3%	<1%	4%
Neutrophils	<750 cells/mm[3]	7%	9%	3%	7%

* None reported in this treatment arm.
a. Based on regimen(s) containing atazanavir sulfate.
b. Median time on therapy.
c. Includes long-term follow-up.
d. ULN = upper limit of normal.
As a fixed-dose combination: 150 mg lamivudine, 300 mg zidovudine twice daily.

Laboratory Abnormalities in Treatment-Experienced Patients

The percentages of adult treatment-experienced patients treated with combination therapy including atazanavir sulfate/ritonavir with Grade 3 to 4 laboratory abnormalities are presented in Table 9.

Table 9: Grade 3 to 4 Laboratory Abnormalities Reported in ≥2% of Adult Treatment-Experienced Patients, Study AI424-045a

Variable	Limit[c]	48 weeks[b] Atazanavir sulfate/ritonavir 300/100 mg once daily + tenofovir + NRTI (n=119)	48 weeks[b] lopinavir/ritonavir 400/100 mg twice daily[d] + tenofovir + NRTI (n=118)
Chemistry	High		
SGOT/AST	≥5.1 x ULN	3%	3%
SGPT/ALT	≥5.1 x ULN	4%	3%
Total Bilirubin	≥2.6 x ULN	49%	<1%
Lipase	≥2.1 x ULN	5%	6%
Creatine Kinase	≥5.1 x ULN	8%	8%
Total Cholesterol	≥240 mg/dL	25%	26%
Triglycerides	≥751 mg/dL	8%	12%
Glucose	≥251 mg/dL	5%	<1%
Hematology	Low		
Platelets	<50,000 cells/mm[3]	2%	3%
Neutrophils	<750 cells/mm[3]	7%	8%

a. Based on regimen(s) containing atazanavir sulfate.
b. Median time on therapy.
c. ULN = upper limit of normal.
e. As a fixed-dose combination.

Lipids, Change from Baseline in Treatment-Naive Patients

For Study AI424-138 and Study AI424-034, changes from baseline in LDL-cholesterol, HDL-cholesterol, total cholesterol, and triglycerides are shown in Tables 10 and 11, respectively.

Table 10: Lipid Values, Mean Change from Baseline, Study AI424-138

	Atazanavir sulfate/ritonavir[a,b]					Lopinavir/ritonavir[b,c]				
	Baseline	Week 48		Week 96		Baseline	Week 48		Week 96	
	mg/dL (n=428[e])	mg/dL (n=372[e])	Changed (n=372[e])	mg/dL (n=342[e])	Changed (n=342[e])	mg/dL (n=424[e])	mg/dL (n=335[e])	Changed (n=335[e])	mg/dL (n=291[e])	Changed (n=291[e])
LDL-Cholesterol[f]	92	105	+14%	105	+14%	93	111	+19%	110	+17%
HDL-Cholesterol[f]	37	46	+29%	44	+21%	36	48	+37%	46	+29%
Total Cholesterol[f]	149	169	+13%	169	+13%	150	187	+25%	186	+25%
Triglycerides[f]	126	145	+15%	140	+13%	129	194	+52%	184	+50%

a. Atazanavir sulfate 300 mg with ritonavir 100 mg once daily with the fixed-dose combination: 300 mg tenofovir, 200 mg emtricitabine once daily.
b. Values obtained after initiation of serum lipid-reducing agents were not included in these analyses. At baseline, serum lipid-reducing agents were used in 1% in the lopinavir/ritonavir treatment arm and 1% in the atazanavir sulfate/ritonavir arm. Through Week 48, serum lipid-reducing agents were used in 8% in the lopinavir/ritonavir treatment arm and 2% in the atazanavir sulfate/ritonavir arm. Through Week 96, serum lipid-reducing agents were used in 10% in the lopinavir/ritonavir treatment arm and 3% in the atazanavir sulfate/ritonavir arm.
c. Lopinavir 400 mg with ritonavir 100 mg twice daily with the fixed-dose combination 300 mg tenofovir, 200 mg emtricitabine once daily.
d. The change from baseline is the mean of within-patient changes from baseline for patients with both baseline and Week 48 or Week 96 values and is not a simple difference of the baseline and Week 48 or Week 96 mean values, respectively.
e. Number of patients with LDL-cholesterol measured.
f. Fasting.

Table 11: Lipid Values, Mean Change from Baseline, Study AI424-034

	Atazanavir sulfate[a,b]			efavirenz[b,c]		
	Baseline mg/dL (n=383[e])	Week 48 mg/dL (n=283[e])	Week 48 Change[d] (n=272[e])	Baseline mg/dL (n=378[e])	Week 48 mg/dL (n=264[e])	Week 48 Change[d] (n=253[e])
LDL-Cholesterol[f]	98	98	+1%	98	114	+18%
HDL-Cholesterol	39	43	+13%	38	46	+24%
Total Cholesterol	164	168	+2%	162	195	+21%
Triglycerides[f]	138	124	-9%	129	168	+23%

a. Atazanavir sulfate 400 mg once daily with the fixed-dose combination: 150 mg lamivudine, 300 mg zidovudine twice daily.
b. Values obtained after initiation of serum lipid-reducing agents were not included in these analyses. At baseline, serum lipid-reducing agents were used in 0% in the efavirenz treatment arm and <1% in the atazanavir sulfate arm. Through Week 48 serum lipid-reducing agents were used in 3% in the efavirenz treatment arm and 1% in the atazanavir sulfate arm.
c. Efavirenz 600 mg once daily with the fixed-dose combination: 150 mg lamivudine, 300 mg zidovudine twice daily.
d. The change from baseline is the mean of within-patient changes from baseline for patients with both baseline and Week 48 values and is not a simple difference of the baseline and Week 48 mean values.
e. Number of patients with LDL-cholesterol measured.
f. Fasting.

Lipids, Change from Baseline in Treatment-Experienced Patients

For Study AI424-045, changes from baseline in LDL-cholesterol, HDL-cholesterol, total cholesterol, and triglycerides are shown in Table 12. The observed magnitude of dyslipidemia was less with atazanavir sulfate/ritonavir than with lopinavir/ritonavir. However, the clinical impact of such findings has not been demonstrated.

Table 12: Lipid Values, Mean Change from Baseline, Study AI424-045

	Atazanavir Sulfate/ritonavir[a,b]			lopinavir/ritonavir[b,c]		
	Baseline mg/dL (n=111[e])	Week 48 mg/dL (n=75[e])	Week 48 Change[d] (n=74[e])	Baseline mg/dL (n=108[e])	Week 48 mg/dL (n=76[e])	Week 48 Change[d] (n=73[e])
LDL-Cholesterol[f]	108	98	-10%	104	103	+1%
HDL-Cholesterol	40	39	-7%	39	41	+2%
Total Cholesterol	188	170	-8%	181	187	+6%
Triglycerides[f]	215	161	-4%	196	224	+30%

a. Atazanavir sulfate 300 mg once daily + ritonavir + tenofovir + 1 NRTI.
b. Values obtained after initiation of serum lipid-reducing agents were not included in these analyses. At baseline, serum lipid-reducing agents were used in 4% in the lopinavir/ritonavir treatment arm and 4% in the atazanavir sulfate/ritonavir arm. Through Week 48 serum lipid-reducing agents were used in 19% in the lopinavir/ritonavir treatment arm and 8% in the atazanavir sulfate/ritonavir arm.
c. Lopinavir/ritonavir (400/100 mg) BID + tenofovir + 1 NRTI.
d. The change from baseline is the mean of within-patient changes from baseline for patients with both baseline and Week 48 values and is not a simple difference of the baseline and Week 48 mean values.
e. Number of patients with LDL-cholesterol measured.
f. Fasting.

6.2 Clinical Trial Experience in Pediatric Patients

The safety and tolerability of Atazanavir Sulfate Capsules with and without ritonavir have been established in pediatric patients at least 6 years of age from the open-label, multicenter clinical trial PACTG 1020A. Use of atazanavir sulfate in pediatric patients less than 6 years of age is under investigation.

The safety profile of atazanavir sulfate in pediatric patients (6 to less than 18 years of age) was comparable to that observed in clinical studies of atazanavir sulfate in adults. The most common Grade 2 to 4 adverse events (≥5%, regardless of causality) reported in pediatric patients were cough (21%), fever (19%), rash (14%), jaundice/scleral icterus (13%), diarrhea (8%), vomiting (8%), headache (7%), and rhinorrhea (6%). Asymptomatic second-degree atrioventricular block was reported in 2% of patients. The most common Grade 3 to 4 laboratory abnormality was elevation of total bilirubin (≥3.2 mg/dL) which occurred in 49% of pediatric patients. All other Grade 3 to 4 laboratory abnormalities occurred with a frequency of less than 3%.

6.3 Patients Co-infected With Hepatitis B and/or Hepatitis C Virus

Liver function tests should be monitored in patients with a history of hepatitis B or C.

In study AI424-138, 60 patients treated with atazanavir sulfate/ritonavir 300 mg/100 mg once daily, and 51 patients treated with lopinavir/ritonavir 400 mg/100 mg twice daily, each with fixed dose tenofovir-emtricitabine, were seropositive for hepatitis B and/or C at study entry. ALT levels >5 times ULN developed in 10% (6/60) of the atazanavir sulfate/ritonavir-treated patients and 8% (4/50) of the lopinavir/ritonavir-treated patients. AST levels >5 times ULN developed in 10% (6/60) of the atazanavir sulfate/ritonavir-treated patients and none (0/50) of the lopinavir/ritonavir-treated patients.

In study AI424-045, 20 patients treated with atazanavir sulfate/ritonavir 300 mg/100 mg once daily, and 18 patients treated with lopinavir/ritonavir 400 mg/100 mg twice daily, were seropositive for hepatitis B and/or C at study entry. ALT levels >5 times ULN developed in 25% (5/20) of the atazanavir sulfate/ritonavir-treated patients and 6% (1/18) of the lopinavir/ritonavir-treated patients. AST levels >5 times ULN developed in 10% (2/20) of the atazanavir sulfate/ritonavir-treated patients and 6% (1/18) of the lopinavir/ritonavir-treated patients.

In studies AI424-008 and AI424-034, 74 patients treated with 400 mg of atazanavir sulfate once daily, 58 who received efavirenz, and 12 who received nelfinavir were seropositive for hepatitis B and/or C at study entry. ALT levels >5 times the upper limit of normal (ULN) developed in 15% of the atazanavir sulfate-treated patients, 14% of the efavirenz-treated patients, and 17% of the nelfinavir-treated patients. AST levels >5 times ULN developed in 9% of the atazanavir sulfate-treated patients, 5% of the efavirenz-treated patients, and 17% of the nelfinavir-treated patients. Within atazanavir and control regimens, no difference in frequency of bilirubin elevations was noted between seropositive and seronegative patients. [See *Warnings and Precautions (5.5)*.]

6.4 Postmarketing Experience

The following events have been identified during postmarketing use of atazanavir sulfate. Because these reactions are reported voluntarily from a population of unknown size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

Body as a Whole: edema

Cardiovascular System: second-degree AV block, third-degree AV block, left bundle branch block, QTc prolongation [see *Warnings and Precautions (5.2)*]

Gastrointestinal System: pancreatitis

Hepatic System: hepatic function abnormalities

Hepatobiliary Disorders: cholelithiasis, cholecystitis, cholestasis

Metabolic System and Nutrition Disorders: diabetes mellitus, hyperglycemia [see *Warnings and Precautions (5.7)*]

Musculoskeletal System: arthralgia

Renal System: nephrolithiasis [see Warnings and Precautions (5.6)]

Skin and Appendages: alopecia, maculopapular rash [see *Contraindications (4)* and *Warnings and Precautions (5.3)*], pruritus

7. DRUG INTERACTIONS

See also *Contraindications (4)* and *Clinical Pharmacology (12.3)*.

7.1 Potential for atazanavir sulfate to Affect Other Drugs

Atazanavir is an inhibitor of CYP3A and UGT1A1. Coadministration of atazanavir sulfate and drugs primarily metabolized by CYP3A or UGT1A1 may result in increased plasma concentrations of the other drug that could increase or prolong its therapeutic and adverse effects.

Atazanavir is a weak inhibitor of CYP2C8. Caution should be used when atazanavir sulfate without ritonavir is coadministered with drugs highly dependent on CYP2C8 with narrow therapeutic indices (eg, paclitaxel, repaglinide). When atazanavir sulfate with ritonavir is coadministered with substrates of CYP2C8, clinically significant interactions are not expected. [See *Clinical Pharmacology, Table 14 (12.3)*.]

The magnitude of CYP3A-mediated drug interactions on coadministered drug may change when atazanavir sulfate is coadministered with ritonavir. See the complete prescribing information for NORVIR® (ritonavir) for information on drug interactions with ritonavir.

7.2 Potential for Other Drugs to Affect Atazanavir

Atazanavir is a CYP3A4 substrate; therefore, drugs that induce CYP3A4 may decrease atazanavir plasma concentrations and reduce atazanavir sulfate's therapeutic effect.

Atazanavir solubility decreases as pH increases. Reduced plasma concentrations of atazanavir are expected if proton-pump inhibitors, antacids, buffered medications, or H_2-receptor antagonists are administered with atazanavir.

7.3 Established and Other Potentially Significant Drug Interactions

Table 13 provides dosing recommendations as a result of drug interactions with atazanavir sulfate. These recommendations are based on either drug interaction studies or predicted interactions due to the expected magnitude of interaction and potential for serious events or loss of efficacy.

Table 13: Established and Other Potentially Significant Drug Interactions: Alteration in Dose or Regimen May Be Recommended Based on Drug Interaction Studies[a] or Predicted Interactions (Information in the table applies to atazanavir sulfate with or without ritonavir, unless otherwise indicated)

Concomitant Drug Class: **Specific Drugs**	Effect on Concentration of Atazanavir or Concomitant Drug	Clinical Comment
HIV Antiviral Agents		
Nucleoside Reverse Transcriptase Inhibitors (NRTIs): didanosine buffered formulations enteric-coated (EC) capsules	↓ atazanavir ↓ didanosine	Coadministration of atazanavir sulfate with didanosine buffered tablets resulted in a marked decrease in atazanavir exposure. It is recommended that atazanavir sulfate be given (with food) 2 h before or 1 h after didanosine buffered formulations. Simultaneous administration of didanosine EC and atazanavir sulfate with food results in a decrease in didanosine exposure. Thus, atazanavir sulfate and didanosine EC should be administered at different times.
Nucleotide Reverse Transcriptase Inhibitors: tenofovir disoproxil fumarate	↓ atazanavir ↑ tenofovir	Tenofovir may decrease the AUC and C_{min} of atazanavir. When coadministered with tenofovir, it is recommended that atazanavir sulfate 300 mg be given with ritonavir 100 mg and tenofovir 300 mg (all as a single daily dose with food). **Atazanavir Sulfate without ritonavir should not be coadministered with tenofovir.** Atazanavir Sulfate increases tenofovir concentrations. The mechanism of this interaction is unknown. Higher tenofovir concentrations could potentiate tenofovir-associated adverse events, including renal disorders. Patients receiving atazanavir sulfate and tenofovir should be monitored for tenofovir associated adverse events.
Non-nucleoside Reverse Transcriptase Inhibitors (NNRTIs): efavirenz	↓ atazanavir	Efavirenz decreases atazanavir exposure. ***In treatment-naive patients:*** If atazanavir sulfate is combined with efavirenz, atazanavir sulfate 400 mg (two 200 mg capsules) with ritonavir 100 mg should be administered once daily all as a single dose with food, and efavirenz 600 mg should be administered once daily on an empty stomach, preferably at bedtime. ***In treatment-experienced patients:*** Do not coadminister atazanavir sulfate with efavirenz in treatment-experienced patients due to decreased atazanavir exposure.
Non-nucleoside Reverse Transcriptase Inhibitors: nevirapine	↓ atazanavir ↑ nevirapine	Do not coadminister atazanavir sulfate with nevirapine because: • Nevirapine substantially decreases atazanavir exposure. • Potential risk for nevirapine associated toxicity due to increased nevirapine exposures.
Protease Inhibitors: saquinavir (soft gelatin capsules)	↑ saquinavir	Appropriate dosing recommendations for this combination, with or without ritonavir, with respect to efficacy and safety have not been established. In a clinical study, saquinavir 1200 mg coadministered with atazanavir sulfate 400 mg and tenofovir 300 mg (all given once daily) plus nucleoside analogue reverse transcriptase inhibitors did not provide adequate efficacy [see *Clinical Studies (14.2)*].
Protease Inhibitors: ritonavir	↑ atazanavir	If atazanavir sulfate is coadministered with ritonavir, it is recommended that atazanavir sulfate 300 mg once daily be given with ritonavir 100 mg once daily with food. See the complete prescribing information for NORVIR® (ritonavir) for information on drug interactions with ritonavir.
Protease Inhibitors: others	↑ other protease inhibitor	**Atazanavir sulfate/ritonavir:** Although not studied, the coadministration of atazanavir sulfate/ritonavir and other protease inhibitors would be expected to increase exposure to the other protease inhibitor. Such coadministration is not recommended.
Other Agents		
Antacids and buffered medications	↓ atazanavir	Reduced plasma concentrations of atazanavir are expected if antacids, including buffered medications, are administered with atazanavir sulfate. Atazanavir sulfate should be administered 2 hours before or 1 hour after these medications.
Antiarrhythmics: amiodarone, bepridil, lidocaine (systemic), quinidine	↑ amiodarone, bepridil, lidocaine (systemic), quinidine	Coadministration with atazanavir sulfate has the potential to produce serious and/or life-threatening adverse events and has not been studied. Caution is warranted and therapeutic concentration monitoring of these drugs is recommended if they are used concomitantly with atazanavir sulfate.
Anticoagulants: warfarin	↑ warfarin	Coadministration with atazanavir sulfate has the potential to produce serious and/or life-threatening bleeding and has not been studied. It is recommended that INR (International Normalized Ratio) be monitored.
Antidepressants: tricyclic antidepressants	↑ tricyclic antidepressants	Coadministration with atazanavir sulfate has the potential to produce serious and/or life-threatening adverse events and has not been studied. Concentration monitoring of these drugs is recommended if they are used concomitantly with atazanavir sulfate.
trazodone	↑ trazodone	Concomitant use of trazodone and atazanavir sulfate with or without ritonavir may increase plasma concentrations of trazodone. Adverse events of nausea, dizziness, hypotension, and syncope have been observed following coadministration of trazodone and ritonavir. If trazodone is used with a CYP3A4 inhibitor such as atazanavir sulfate, the combination should be used with caution and a lower dose of trazodone should be considered.
Antifungals: ketoconazole, itraconazole	**Atazanavir sulfate/ ritonavir:** ↑ ketoconazole ↑ itraconazole	Coadministration of ketoconazole has only been studied with atazanavir sulfate without ritonavir (negligible increase in atazanavir AUC and Cmax). Due to the effect of ritonavir on ketoconazole, high doses of ketoconazole and itraconazole (>200 mg/day) should be used cautiously with atazanavir sulfate/ritonavir.
Antifungals: voriconazole	Effect is unknown	Coadministration of voriconazole with atazanavir sulfate, with or without ritonavir, has not been studied. Administration of voriconazole with ritonavir 100 mg every 12 hours decreased voriconazole steady-state AUC by an average of 39%. Voriconazole should not be administered to patients receiving atazanavir sulfate/ritonavir, unless an assessment of the benefit/risk to the patient justifies the use of voriconazole. Coadministration of voriconazole with atazanavir sulfate (without ritonavir) may increase atazanavir concentrations; however, no data are available.
Antigout: colchicine	↑ colchicine	Atazanavir sulfate should not be coadministered with colchicine to patients with renal or hepatic impairment. ***Recommended dosage of colchicine when administered with atazanavir sulfate:*** ***Treatment of gout flares:*** 0.6 mg (1 tablet) for 1 dose, followed by 0.3 mg (half tablet) 1 hour later. Not to be repeated before 3 days. ***Prophylaxis of gout flares:*** If the original regimen was 0.6 mg *twice* a day, the regimen should be adjusted to 0.3 mg *once a day.* If the original regimen was 0.6 mg once a day, the regimen should be adjusted to 0.3 mg *once every other day.* ***Treatment of familial Mediterranean fever (FMF):*** Maximum daily dose of 0.6 mg (may be given as 0.3 mg twice a day).
Antimycobacterials: rifabutin	↑ rifabutin	A rifabutin dose reduction of up to 75% (eg, 150 mg every other day or 3 times per week) is recommended. Increased monitoring for rifabutin-associated adverse reactions including neutropenia is warranted.
Benzodiazepines: parenterally administered midazolam[b]	↑ midazolam	Concomitant use of parenteral midazolam with atazanavir sulfate may increase plasma concentrations of midazolam. Coadministration should be done in a setting which ensures close clinical monitoring and appropriate medical management in case of respiratory depression and/or prolonged sedation. Dosage reduction for midazolam should be considered, especially if more than a single dose of midazolam is administered. Coadministration of oral midazolam with atazanavir sulfate is CONTRAINDICATED.
Calcium channel blockers: diltiazem	↑ diltiazem and desacetyl-diltiazem	Caution is warranted. A dose reduction of diltiazem by 50% should be considered. ECG monitoring is recommended. Coadministration of atazanavir sulfate/ritonavir with diltiazem has not been studied.
eg, felodipine, nifedipine, nicardipine, and verapamil	↑ calcium channel blocker	Caution is warranted. Dose titration of the calcium channel blocker should be considered. ECG monitoring is recommended.
Endothelin receptor antagonists: bosentan	↓ atazanavir ↑ bosentan	Plasma concentrations of atazanavir may be decreased when bosentan is administered with atazanavir sulfate without ritonavir. Coadministration of bosentan and atazanavir sulfate without ritonavir is not recommended. ***Coadministration of bosentan in patients on atazanavir sulfate/ritonavir:*** For patients who have been receiving atazanavir sulfate/ritonavir for at least 10 days, start bosentan at 62.5 mg once daily or every other day based on individual tolerability. ***Coadministration of atazanavir sulfate/ritonavir in patients on bosentan:*** Discontinue bosentan at least 36 hours before starting atazanavir sulfate/ritonavir. At least 10 days after starting atazanavir sulfate/ritonavir, resume bosentan at 62.5 mg once daily or every other day based on individual tolerability.
HMG-CoA reductase inhibitors: atorvastatin, rosuvastatin	↑ atorvastatin ↑ rosuvastatin	Use the lowest possible dose of atorvastatin or rosuvastatin with careful monitoring, or consider other HMG-CoA reductase inhibitors such as pravastatin or fluvastatin in combination with atazanavir sulfate (with or without ritonavir). The risk of myopathy, including rhabdomyolysis, may be increased when HIV protease inhibitors, including atazanavir sulfate, are used in combination with these drugs.
H_2-Receptor antagonists	↓ atazanavir	Plasma concentrations of atazanavir were substantially decreased when atazanavir sulfate 400 mg once daily was administered simultaneously with famotidine 40 mg twice daily, which may result in loss of therapeutic effect and development of resistance. ***In treatment-naive patients:*** Atazanavir sulfate 300 mg with ritonavir 100 mg once daily with food should be administered simultaneously with, and or at least 10 hours after, a dose of the H_2-receptor antagonist. An H_2-receptor antagonist dose comparable to famotidine 20 mg once daily up to a dose comparable to famotidine 40 mg twice daily can be used with atazanavir sulfate 300 mg with ritonavir 100 mg in treatment-naive patients. OR For patients unable to tolerate ritonavir, atazanavir sulfate 400 mg once daily with food should be administered at least 2 hours before and at least 10 hours after a dose of the H_2-receptor antagonist. No single dose of the H_2-receptor antagonist should exceed a dose comparable to famotidine 20 mg, and the total daily dose should not exceed a dose comparable to famotidine 40 mg. ***In treatment-experienced patients:*** Whenever an H_2-receptor antagonist is given to a patient receiving atazanavir sulfate with ritonavir, the H_2-receptor antagonist dose should not exceed a dose comparable to famotidine 20 mg twice daily, and the atazanavir sulfate and ritonavir doses should be administered simultaneously with, and/or at least 10 hours after, the dose of the H_2-receptor antagonist. • Atazanavir sulfate 300 mg with ritonavir 100 mg once daily (all as a single dose with food) if taken with an H_2-receptor antagonist. • Atazanavir sulfate 400 mg with ritonavir 100 mg once daily (all as a single dose with food) if taken with both tenofovir and an H_2-receptor antagonist.
Hormonal contraceptives: ethinyl estradiol and norgestimate or norethindrone	↓ ethinyl estradiol ↑ norgestimate[c]	Use with caution if coadministration of atazanavir sulfate or atazanavir sulfate/ritonavir with oral contraceptives is considered. If an oral contraceptive is administered with atazanavir sulfate plus ritonavir, it is recommended that the oral contraceptive contain at least 35 mcg of ethinyl estradiol. If atazanavir sulfate is administered without ritonavir, the oral contraceptive should contain no more than 30 mcg of ethinyl estradiol.
	↑ ethinyl estradiol ↑ norethindrone[d]	Potential safety risks include substantial increases in progesterone exposure. The long-term effects of increases in concentration of the progestational agent are unknown and could increase the risk of insulin resistance, dyslipidemia, and acne. Coadministration of atazanavir sulfate or atazanavir sulfate/ritonavir with other hormonal contraceptives (eg, contraceptive patch, contraceptive vaginal ring, or injectable contraceptives) or oral contraceptives containing progestagens other than norethindrone or norgestimate, or less than 25 mcg of ethinyl estradiol, has not been studied; therefore, alternative methods of contraception are recommended.
Immunosuppressants: cyclosporin, sirolimus, tacrolimus	↑ immunosuppressants	Therapeutic concentration monitoring is recommended for immunosuppressant agents when coadministered with atazanavir sulfate.
Inhaled beta agonist: salmeterol	↑ salmeterol	Coadministration of salmeterol with atazanavir sulfate is not recommended. Concomitant use of salmeterol and atazanavir sulfate may result in increased risk of cardiovascular adverse events associated with salmeterol, including QT prolongation, palpitations, and sinus tachycardia.
Inhaled/nasal steroid: fluticasone	***Atazanavir sulfate*** ↑ fluticasone	Concomitant use of fluticasone propionate and atazanavir sulfate (without ritonavir) may increase plasma concentrations of fluticasone propionate. Use with caution. Consider alternatives to fluticasone propionate, particularly for long-term use.
	Atazanavir sulfate/ritonavir ↑ fluticasone	Concomitant use of fluticasone propionate and atazanavir sulfate/ritonavir may increase plasma concentrations of fluticasone propionate, resulting in significantly reduced serum cortisol concentrations. Systemic corticosteroid effects, including Cushing's syndrome and adrenal suppression, have been reported during postmarketing use in patients receiving ritonavir and inhaled or intranasally administered fluticasone propionate. Coadministration of fluticasone propionate and atazanavir sulfate/ritonavir is not recommended unless the potential benefit to the patient outweighs the risk of systemic corticosteroid side effects [see *Warnings and Precautions (5.1)*].
Macrolide antibiotics: clarithromycin	↑ clarithromycin ↓ 14-OH clarithromycin ↑ atazanavir	Increased concentrations of clarithromycin may cause QTc prolongations; therefore, a dose reduction of clarithromycin by 50% should be considered when it is coadministered with atazanavir sulfate. In addition, concentrations of the active metabolite 14-OH clarithromycin are significantly reduced; consider alternative therapy for indications other than infections due to *Mycobacterium avium* complex. Coadministration of atazanavir sulfate/ritonavir with clarithromycin has not been studied.
Opioids: Buprenorphine	↑ buprenorphine ↑ norbuprenorphine	Coadministration of buprenorphine and atazanavir sulfate with or without ritonavir increases the plasma concentration of buprenorphine and norbuprenorphine. Coadministration of atazanavir sulfate plus ritonavir with buprenorphine warrants clinical monitoring for sedation and cognitive effects. A dose reduction of buprenorphine may be considered. Coadministration of buprenorphine and atazanavir sulfate with ritonavir is not expected to decrease atazanavir plasma concentrations. Coadministration of buprenorphine and atazanavir sulfate without ritonavir may decrease atazanavir plasma concentrations. Atazanavir without ritonavir should not be coadministered with buprenorphine.
PDE5 inhibitors: sildenafil, tadalafil, vardenafil	↑ sildenafil ↑ tadalafil ↑ vardenafil	Coadministration with atazanavir sulfate has not been studied but may result in an increase in PDE5 inhibitor-associated adverse events, including hypotension, syncope, visual disturbances, and priapism. ***Use of PDE5 inhibitors for pulmonary arterial hypertension (PAH):*** Use of REVATIO®, (Sildenafil) for the treatement of pulmonary hypertension (PAH) is contraindicated with atazanavir sulfate [see *Contraindications (4)*]. The following dose adjustments are recommended for the use of ADCIRCA® (tadalafil) with atazanavir sulfate. Coadministration of ADCIRCA® in patients on atazanavir sulfate (with or without ritonavir): • For patients receiving atazanavir sulfate (with or without ritonavir) for at least one week, start ADCIRCA® at 20 mg once daily. Increase to 40 mg once daily based on individual tolerability. Coadministration of atazanavir sulfate (with or without ritonavir) in patients on ADCIRCA®. • Avoid the use of ADCIRCA® when starting atazanavir sulfate (with or without ritonavir). Stop ADCIRCA® at least 24 hours before starting atazanavir sulfate (with or without ritonavir). At least one week after starting atazanavir sulfate (with or without ritonavir), resume ADCIRCA® at 20 mg once daily. Increase to 40 mg once daily based on individual tolerability. ***Use of PDE5 inhibitors for erectile dysfunction:*** Use VIAGRA® (Sildenafil) with caution at reduced doses of 25 mg every 48 hours with increased monitoring for adverse events. Use CIALIS® (tadalafil) with caution at reduced doses of 10 mg every 72 hours with increased monitoring for adverse events. ***Atazanavir sulfate / ritonavir:*** Use LEVITRA® (vardenafil) with caution at reduced doses of no more than 2.5 mg every 72 hours with increased monitoring for adverse events. ***Atazanavir sulfate:*** Use LEVITRA® (vardenafil) with caution at reduced doses of no more than 2.5 mg every 24 hours with increased monitoring for adverse events.
Proton-pump inhibitors: omeprazole	↓ atazanavir	Plasma concentrations of atazanavir were substantially decreased when atazanavir sulfate 400 mg or atazanavir sulfate 300 mg/ritonavir 100 mg once daily was administered with omeprazole 40 mg once daily, which may result in loss of therapeutic effect and development of resistance. ***In treatment-naive patients:*** The proton-pump inhibitor dose should not exceed a dose comparable to omeprazole 20 mg and must be taken approximately 12 hours prior to the atazanavir sulfate 300 mg with ritonavir 100 mg dose. ***In treatment-experienced patients:*** Proton-pump inhibitors should not be used in treatment-experienced patients receiving atazanavir sulfate.

a. For magnitude of interactions see *Clinical Pharmacology, Tables 16* and *17 (12.3)*.
b. See *Contraindications (4), Table 3* for orally administered midazolam.
c. In combination with atazanavir 300 mg and ritonavir 100 mg once daily.
d. In combination with atazanavir 400 mg once daily.

7.4 Drugs with No Observed or Predicted Interactions with atazanavir sulfate

Clinically significant interactions are not expected between atazanavir and substrates of CYP2C19, CYP2C9, CYP2D6, CYP2B6, CYP2A6, CYP1A2, or CYP2E1. Clinically significant interactions are not expected between atazanavir when administered with ritonavir and substrates of CYP2C8. See the complete prescribing information for NORVIR® for information on other potential drug interactions with ritonavir.

Based on known metabolic profiles, clinically significant drug interactions are not expected between atazanavir sulfate and fluvastatin, pravastatin, dapsone, trimethoprim/sulfamethoxazole, azithromycin, or erythromycin. Atazanavir sulfate does not interact with substrates of CYP2D6 (eg, nortriptyline, desipramine, metoprolol). Additionally, no clinically significant drug interactions were observed when atazanavir sulfate was coadministered with methadone, fluconazole, acetaminophen, or atenolol. [See *Clinical Pharmacology, Tables 16 and 17 (12.3)*.]

8. USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Pregnancy Category B

There are no adequate and well controlled studies of atazanavir use during pregnancy. Cases of lactic acidosis syndrome and symptomatic hyperlactatemia have occurred in pregnant women using atazanavir sulfate in combination with nucleoside analogues. In animal reproduction

and pre-and post-natal development studies, there was no evidence of adverse fetal effects or teratogenicity. Because animal reproduction studies are not always predictive of human response, atazanavir sulfate should be used during pregnancy only if clearly needed.

Cases of lactic acidosis syndrome, sometimes fatal, and symptomatic hyperlactatemia have been reported in patients (including pregnant women) receiving atazanavir sulfate in combination with nucleoside analogues. Nucleoside analogues are associated with an increased risk of lactic acidosis syndrome. In addition, hyperbilirubinemia occurred frequently during treatment with atazanavir sulfate. It is not known whether atazanavir sulfate administered during pregnancy will exacerbate physiological hyperbilirubinemia or increase the risk of kernicterus in neonates and young infants. In the prepartum period, additional monitoring and alternative therapy should be considered.

In animal reproduction studies, there was no evidence of teratogenicity in offspring born to animals exposed to atazanavir levels one (in rabbits) to two times (in rats) those observed at the human clinical dose (400 mg once daily). In pre- and post-natal development studies in rats, there were no adverse effects on offspring following maternal exposure to atazanavir levels equivalent to those in humans taking 400 mg once daily. Weight loss and weight gain suppression occurred in pups with maternal atazanavir exposures two times the human exposure at 400 mg once daily; however, maternal toxicity also occurred at this exposure level.

Antiretroviral Pregnancy Registry: To monitor maternal-fetal outcomes of pregnant women exposed to atazanavir sulfate, an Antiretroviral Pregnanacy Registry has been established. Physicians are encouraged to register patients by calling 1-800-258-4263.

8.3 Nursing Mothers

The Centers for Disease Control and Prevention recommend that HIV-infected mothers not breast-feed their infants to avoid risking postnatal transmission of HIV. It is not known whether atazanavir is present in human milk. Because of both the potential for HIV transmission and the potential for serious adverse reactions in nursing infants, **mothers should be instructed not to breast-feed if they are taking atazanavir sulfate.**

8.4 Pediatric Use

Atazanavir sulfate should not be administered to pediatric patients below the age of 3 months due to the risk of kernicterus.

The safety, activity, and pharmacokinetic profiles of atazanavir sulfate in pediatric patients ages 3 months to less than 6 years have not been established.

The safety, pharmacokinetic profile, and virologic response of atazanavir sulfate were evaluated in pediatric patients in an open-label, multicenter clinical trial PACTG 1020A [see *Clinical Pharmacology (12.3)* and *Clinical Studies (14.3)]*. The safety profile in pediatric patients was comparable to that observed in adults [see *Adverse Reactions (6.2)*]. Please see *Dosage and Administration (2.2)* for dosing recommendations for pediatric patients 6 years of age and older.

8.5 Geriatric Use

Clinical studies of atazanavir sulfate did not include sufficient numbers of patients aged 65 and over to determine whether they respond differently from younger patients. Based on a comparison of mean single-dose pharmacokinetic values for C_{max} and AUC, a dose adjustment based upon age is not recommended. In general, appropriate caution should be exercised in the administration and monitoring of atazanavir sulfate in elderly patients reflecting the greater frequency of decreased hepatic, renal, or cardiac function, and of concomitant disease or other drug therapy.

8.6 Age/Gender

A study of the pharmacokinetics of atazanavir was performed in young (n=29; 18 to 40 years) and elderly (n=30; ≥65 years) healthy subjects. There were no clinically important pharmacokinetic differences observed due to age or gender.

8.7 Impaired Renal Function

In healthy subjects, the renal elimination of unchanged atazanavir was approximately 7% of the administered dose. Atazanavir sulfate has been studied in adult subjects with severe renal impairment (n=20), including those on hemodialysis, at multiple doses of 400 mg once daily. The mean atazanavir C_{max} was 9% lower, AUC was 19% higher, and C_{min} was 96% higher in subjects with severe renal impairment not undergoing hemodialysis (n=10), than in age, weight, and gender matched subjects with normal renal function. Atazanavir was not appreciably cleared during hemodialysis. In a 4-hour dialysis session, 2.1% of the administered dose was removed. When atazanavir was administered either prior to, or following hemodialysis (n=10), the geometric means for C_{max}, AUC, and C_{min} were approximately 25 to 43% lower compared to subjects with normal renal function. The mechanism of this decrease is unknown. Atazanavir sulfate should not be administered to HIV-treatment experienced patients with end stage renal disease managed with hemodialysis. [See *Dosage and Administration (2.3).*]

8.8 Impaired Hepatic Function

Atazanavir is metabolized and eliminated primarily by the liver. Atazanavir sulfate has been studied in adult subjects with moderate to severe hepatic impairment (14 Child-Pugh B and 2 Child-Pugh C subjects) after a single 400-mg dose. The mean $AUC_{(0-\infty)}$ was 42% greater in subjects with impaired hepatic function than in healthy volunteers. The mean half-life of atazanavir in hepatically impaired subjects was 12.1 hours compared to 6.4 hours in healthy volunteers. Increased concentrations of atazanavir are expected in patients with moderately or severely impaired hepatic function. The pharmacokinetics of atazanavir sulfate in combination with ritonavir have not been studied in subjects with hepatic impairment. Atazanavir sulfate should not be administered to patients with severe hepatic impairment. Atazanavir sulfate/ritonavir is not recommended for use in patients with hepatic impairment. [See *Dosage and Administration (2.4) and Warnings* and *Precautions (5.5).*]

10. OVERDOSAGE

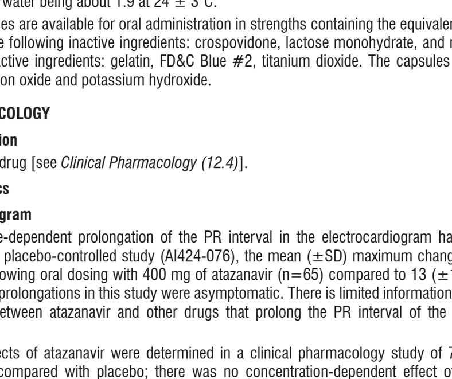
Human experience of acute overdose with atazanavir sulfate is limited. Single doses up to 1200 mg have been taken by healthy volunteers without symptomatic untoward effects. A single self-administered overdose of 29.2 g of atazanavir sulfate in an HIV-infected patient (73 times the 400-mg recommended dose) was associated with asymptomatic bifascicular block and PR interval prolongation. These events resolved spontaneously. At high doses that lead to high drug exposures, jaundice due to indirect (unconjugated) hyperbilirubinemia (without associated liver function test changes) or PR interval prolongation may be observed. [See *Warnings and Precautions (5.2, 5.4)* and *Clinical Pharmacology (12.2).*]

Treatment of overdosage with atazanavir sulfate should consist of general supportive measures, including monitoring of vital signs and ECG, and observations of the patient's clinical status. If indicated, elimination of unabsorbed atazanavir should be achieved by emesis or gastric lavage. Administration of activated charcoal may also be used to aid removal of unabsorbed drug. There is no specific antidote for overdose with atazanavir sulfate. Since atazanavir is extensively metabolized by the liver and is highly protein bound, dialysis is unlikely to be beneficial in significant removal of this medicine.

11. DESCRIPTION

Atazanavir sulfate is an azapeptide inhibitor of HIV-1 protease.

The chemical name for atazanavir sulfate is (3S,8S,9S,12S)-3,12-Bis (1,1-dimethylethyl)-8hydroxy-4,11-dioxo-9-(phenylmethyl)-6-[[4-(2-pyridinyl)phenyl]methyl]-2,5,6,10,13-pentaazatetradecanedioic acid dimethyl ester, sulfate (1:1). Its molecular formula is $C_{38}H_{52}N_6O_7 \cdot H_2SO_4$, which corresponds to a molecular weight of 802.9 (sulfuric acid salt). The free base molecular weight is 704.9. Atazanavir sulfate has the following structural formula:



Atazanavir sulfate is a white to pale yellow crystalline powder. It is slightly soluble in water (4 to 5 mg/mL, free base equivalent) with the pH of a saturated solution in water being about 1.9 at 24 ± 3°C.

Atazanavir sulfate Capsules are available for oral administration in strengths containing the equivalent of 150 mg or 300 mg of atazanavir as atazanavir sulfate and the following inactive ingredients: crospovidone, lactose monohydrate, and magnesium stearate. The capsule shells contain the following inactive ingredients: gelatin, FD&C Blue #2, titanium dioxide. The capsules are printed with ink containing shellac, propylene glycol, black iron oxide and potassium hydroxide.

12. CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

Atazanavir is an antiviral drug [see *Clinical Pharmacology (12.4)*].

12.2 Pharmacodynamics

Effects on Electrocardiogram

Concentration- and dose-dependent prolongation of the PR interval in the electrocardiogram has been observed in healthy volunteers receiving atazanavir. In a placebo-controlled study (AI424-076), the mean (±SD) maximum change in PR interval from the predose value was 24 (±15) msec following oral dosing with 400 mg of atazanavir (n=65) compared to 13 (±11) msec following dosing with placebo (n=67). The PR interval prolongations in this study were asymptomatic. There is limited information on the potential for a pharmacodynamic interaction in humans between atazanavir and other drugs that prolong the PR interval of the electrocardiogram. [See *Warnings and Precautions (5.2).*]

Electrocardiographic effects of atazanavir were determined in a clinical pharmacology study of 72 healthy subjects. Oral doses of 400 mg and 800 mg were compared with placebo; there was no concentration-dependent effect of atazanavir on the QTc interval (using Fridericia's correction). In 1793 HIV-infected patients receiving antiretroviral regimens, QTc prolongation was comparable in the atazanavir and comparator regimens. No atazanavir-treated healthy subject or HIV-infected patient in clinical trials had a QTc interval >500 msec. [See *Warnings and Precautions (5.2).*]

In a pharmacokinetic study between atazanavir 400 mg once daily and diltiazem 180 mg once daily, a CYP3A substrate, there was a 2-fold increase in the diltiazem plasma concentration and an additive effect on the PR interval. In a pharmacokinetic study between atazanavir 400 mg once daily and atenolol 50 mg once daily, there was no substantial additive effect of atazanavir and atenolol on the PR interval. [See *Warnings and Precautions (5.2).*]

12.3 Pharmacokinetics

The pharmacokinetics of atazanavir were evaluated in healthy adult volunteers and in HIV-infected patients after administration of atazanavir sulfate 400 mg once daily and after administration of atazanavir sulfate 300 mg with ritonavir 100 mg once daily (see Table 14).

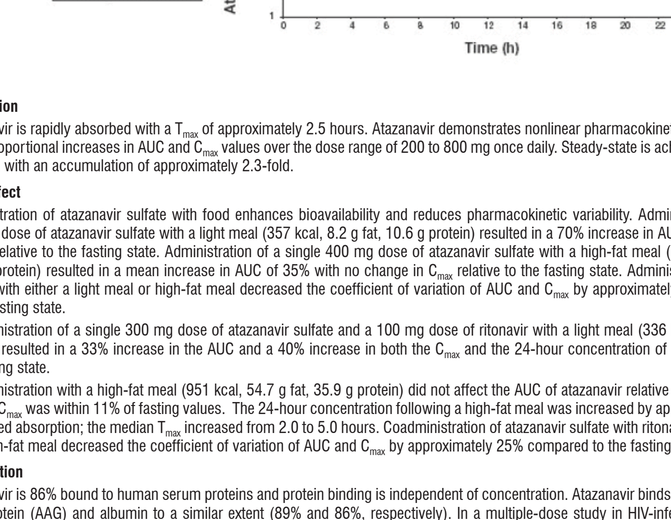
Table 14: Steady-State Pharmacokinetics of Atazanavir in Healthy Subjects or HIV-Infected Patients in the Fed State

	400 mg once daily		300 mg with ritonavir 100 mg once daily	
	Healthy Subjects	HIV-Infected Patients	Healthy Subjects	HIV-Infected Patients
Parameter	(n=14)	(n=13)	(n=28)	(n=10)
C_{max} (ng/mL)				
Geometric mean (CV%)	5199 (26)	2298 (71)	6129 (31)	4422 (58)
Mean (SD)	5358 (1371)	3152 (2231)	6450 (2031)	5233 (3033)
T_{max} (h)				
Median	2.5	2.0	2.7	3.0
AUC (ng•h/mL)				
Geometric mean (CV%)	28132 (28)	14874 (91)	57039 (37)	46073 (66)
Mean (SD)	29303 (8263)	22262 (20159)	61435 (22911)	53761 (35294)
T-half (h)				
Mean (SD)	7.9 (2.9)	6.5 (2.6)	18.1 (6.2)[a]	8.6 (2.3)
C_{min} (ng/mL)				
Geometric mean (CV%)	159 (88)	120 (109)	1227 (53)	636 (97)
Mean (SD)	218 (191)	273 (298)[b]	1441 (757)	862 (838)

a n=26.
b n=12.

Figure 1 displays the mean plasma concentrations of atazanavir at steady state after atazanavir sulfate 400 mg once daily (as two 200-mg capsules) with a light meal and after atazanavir sulfate 300 mg (as two 150-mg capsules) with ritonavir 100 mg once daily with a light meal in HIV-infected adult patients.

Figure 1: Mean (SD) Steady-State Plasma Concentrations of Atazanavir 400 mg (n=13) and 300 mg with Ritonavir (n=10) for HIV-Infected Adult Patients



Absorption

Atazanavir is rapidly absorbed with a T_{max} of approximately 2.5 hours. Atazanavir demonstrates nonlinear pharmacokinetics with greater than dose-proportional increases in AUC and C_{max} values over the dose range of 200 to 800 mg once daily. Steady-state is achieved between Days 4 and 8, with an accumulation of approximately 2.3-fold.

Food Effect

Administration of atazanavir sulfate with food enhances bioavailability and reduces pharmacokinetic variability. Administration of a single 400 mg dose of atazanavir sulfate with a light meal (357 kcal, 8.2 g fat, 10.6 g protein) resulted in a 70% increase in AUC and 57% increase in C_{max} relative to the fasting state. Administration of a single 400 mg dose of atazanavir sulfate with a high-fat meal (721 kcal, 37.3 g fat, 29.4 g protein) resulted in a mean increase in AUC of 35% with no change in C_{max} relative to the fasting state. Administration of atazanavir sulfate with either a light meal or high-fat meal decreased the coefficient of variation of AUC and C_{max} by approximately one half compared to the fasting state.

Coadministration of a single 300 mg dose of atazanavir sulfate and a 100 mg dose of ritonavir with a light meal (336 kcal, 5.1 g fat, 9.3 g protein) resulted in a 33% increase in the AUC and a 40% increase in both the C_{max} and the 24-hour concentration of atazanavir relative to the fasting state.

Coadministration with a high-fat meal (951 kcal, 54.7 g fat, 35.9 g protein) did not affect the AUC of atazanavir relative to fasting conditions and the C_{max} was within 11% of fasting values. The 24-hour concentration following a high-fat meal was increased by approximately 33% due to delayed absorption; the median T_{max} increased from 2.0 to 5.0 hours. Coadministration of atazanavir sulfate with ritonavir with either a light or a high-fat meal decreased the coefficient of variation of AUC and C_{max} by approximately 25% compared to the fasting state.

Distribution

Atazanavir is 86% bound to human serum proteins and protein binding is independent of concentration. Atazanavir binds to both alpha-1-acid glycoprotein (AAG) and albumin to a similar extent (89% and 86%, respectively). In a multiple-dose study in HIV-infected patients dosed with atazanavir sulfate 400 mg once daily with a light meal for 12 weeks, atazanavir was detected in the cerebrospinal fluid and semen. The cerebrospinal fluid/plasma ratio for atazanavir (n=4) ranged between 0.0021 and 0.0226 and seminal fluid/plasma ratio (n=5) ranged between 0.11 and 4.42.

Metabolism

Atazanavir is extensively metabolized in humans. The major biotransformation pathways of atazanavir in humans consisted of monooxygenation and dioxygenation. Other minor biotransformation pathways for atazanavir or its metabolites consisted of glucuronidation, N-dealkylation, hydrolysis, and oxygenation with dehydrogenation. Two minor metabolites of atazanavir in plasma have been characterized. Neither metabolite demonstrated *in vitro* antiviral activity. *In vitro* studies using human liver microsomes suggested that atazanavir is metabolized by CYP3A.

Elimination

Following a single 400-mg dose of ^{14}C-atazanavir, 79% and 13% of the total radioactivity was recovered in the feces and urine, respectively. Unchanged drug accounted for approximately 20% and 7% of the administered dose in the feces and urine, respectively. The mean elimination half-life of atazanavir in healthy volunteers (n=214) and HIV-infected adult patients (n=13) was approximately 7 hours at steady state following a dose of 400 mg daily with a light meal.

Special Populations

Pediatrics

The pharmacokinetic data from pediatric patients receiving atazanavir sulfate Capsules with ritonavir based on body surface area are presented in Table 15.

Table 15: Steady-State Pharmacokinetics of Atazanavir with ritonavir in HIV-Infected Pediatric Patients (6 to less than 18 years of age) in the Fed State

	205 mg/m² atazanavir with 100 mg/m² ritonavir once daily Age Range (years)	
	at least 6 to 13 (n=17)	at least 13 to 18 (n=10)
Dose *mg* Median [min-max]	200 [150–400]	400 [250–500]
C_{max} ng/mL Geometric mean (CV%)	4451 (33)	3711 (46)
AUC ng•h/mL Geometric mean (CV%)	42503 (36)	44970 (34)
C_{min} ng/mL Geometric mean (CV%)	535 (62)	1090 (60)

Drug Interaction Data

Atazanavir is a metabolism-dependent CYP3A inhibitor, with a K_{inact} value of 0.05 to 0.06 min^{-1} and K_i value of 0.84 to 1.0 μM. Atazanavir is also a direct inhibitor for UGT1A1 (K_i=1.9 μM) and CYP2C8 (K_i=2.1 μM).

Atazanavir has been shown *in vivo* not to induce its own metabolism, nor to increase the biotransformation of some drugs metabolized by CYP3A. In a multiple-dose study, atazanavir sulfate decreased the urinary ratio of endogenous 6β-OH cortisol to cortisol versus baseline, indicating that CYP3A production was not induced.

Drug interaction studies were performed with atazanavir sulfate and other drugs likely to be coadministered and some drugs commonly used as probes for pharmacokinetic interactions. The effects of coadministration of atazanavir sulfate on the AUC, C_{max}, and C_{min} are summarized in Tables 16 and 17. For information regarding clinical recommendations, see *Drug Interactions (7)*.

Table 16: Drug Interactions: Pharmacokinetic Parameters for Atazanavir in the Presence of Coadministered Drugs[a]

Coadministered Drug	Coadministered Drug Dose/Schedule	Atazanavir sulfate Dose/Schedule	Ratio (90% Confidence Interval) of Atazanavir Pharmacokinetic Parameters with/without Co-administered Drug; No Effect = 1.00		
			C_{max}	AUC	C_{min}
atenolol	50 mg QD, d 7–11 (n=19) and d 19–23	400 mg QD, d 1–11 (n=19)	1.00 (0.89, 1.12)	0.93 (0.85, 1.01)	0.74 (0.65, 0.86)
clarithromycin	500 mg BID, d 7–10 (n=29) and d 18–21	400 mg QD, d 1–10 (n=29)	1.06 (0.93, 1.20)	1.28 (1.16, 1.43)	1.91 (1.66, 2.21)
didanosine (ddI) (buffered tablets) plus stavudine (d4T)[b]	ddI: 200 mg x 1 dose, d4T: 40 mg x 1 dose (n=31)	400 mg x 1 dose simultaneously with ddI and d4T (n=31)	0.11 (0.06, 0.18)	0.13 (0.08, 0.21)	0.16 (0.10, 0.27)
	ddI: 200 mg x 1 dose, d4T: 40 mg x 1 dose (n=32)	400 mg x 1 dose 1 h after ddI + d4T (n=32)	1.12 (0.67, 1.18)	1.03 (0.64, 1.67)	1.03 (0.61, 1.73)
ddI (enteric-coated [EC] capsules)[c]	400 mg d 8 (fed) (n=34) 400 mg d 19 (fed) (n=31)	400 mg QD, d 2–8 (n=34) 300 mg/ ritonavir 100 mg QD, d 9–19 (n=31)	1.03 (0.93, 1.14) 1.04 (1.01, 1.07)	0.99 (0.91, 1.08) 1.00 (0.96, 1.03)	0.98 (0.89, 1.08) 0.87 (0.82, 0.92)
diltiazem	180 mg QD, d 7–11 (n=30) and d 19–23	400 mg QD, d 1–11 (n=30)	1.04 (0.96, 1.11)	1.00 (0.95, 1.05)	0.98 (0.90, 1.07)
efavirenz	600 mg QD, d 7–20 (n=27)	400 mg QD, d 1–20 (n=27)	0.41 (0.33, 0.51)	0.26 (0.22, 0.32)	0.07 (0.05, 0.10)
	600 mg QD, d 7–20 (n=13)	400 mg QD, d 1–6 (n=23) then 300 mg/ritonavir 100 mg QD, 2 h before efavirenz, d 7–20 (n=13)	1.14 (0.83, 1.58)	1.39 (1.02, 1.88)	1.48 (1.24, 1.76)
	600 mg QD, d 11–24 (pm) (n=14)	300 mg QD/ritonavir 100 mg QD, d 1–10 (pm) (n=22), then 400 mg QD/ritonavir 100 mg QD, d 11–24 (pm), (simultaneous with efavirenz) (n=14)	1.17 (1.08, 1.27)	1.00 (0.91, 1.10)	0.58 (0.49, 0.69)
famotidine	40 mg BID, d 7–12 (n=15)	400 mg QD, d 1–6 (n=45), d 7–12 (simultaneous administration) (n=15)	0.53 (0.34, 0.82)	0.59 (0.40, 0.87)	0.58 (0.37, 0.89)
	40 mg BID, d 7–12 (n=14)	400 mg QD (pm), d 1–6 (n=14), d 7–12 (10 h after, 2 h before famotidine) (n=14)	1.08 (0.82, 1.41)	0.95 (0.74, 1.21)	0.79 (0.60, 1.04)
	40 mg BID, d 11–20 (n=14)d	300 mg QD/ritonavir 100 mg QD, d 1–10 (n=46), d 11–20[d] (simultaneous administration) (n=14)	0.86 (0.79, 0.94)	0.82 (0.75, 0.89)	0.72 (0.64, 0.81)
	20 mg BID, d 11–17 (n=18)	300 mg QD/ ritonavir 100 mg QD/ tenofovir 300 mg QD, d 1–10 (am) (n=39), d 11–17 (am) (simultaneous administration with am famotidine) (n=18)[e,f]	0.91 (0.84, 0.99)	0.90 (0.82, 0.98)	0.81 (0.69, 0.94)
	40 mg QD (pm), d 18–24 (n=20)	300 mg QD/ritonavir 100 mg QD/tenofovir 300 mg QD, d 1–10 (am) (n=39), d 18–24 (am) (12 h after pm famotidine) (n=20)[f]	0.89 (0.81, 0.97)	0.88 (0.80, 0.96)	0.77 (0.63, 0.93)
	40 mg BID, d 18–24 (n=18)	300 mg QD/ritonavir 100 mg QD/tenofovir 300 mg QD, d 1–10 (am) (n=39), d 18–24 (am) (10 h after pm famotidine and 2 h before am famotidine) (n=18)[f]	0.74 (0.66, 0.84)	0.79 (0.70, 0.88)	0.72 (0.63, 0.83)
	40 mg BID, d 11–20 (n=15)	300 mg QD/ritonavir 100 mg QD, d 1–10 (am) (n=46), then 400 mg QD/ritonavir 100 mg QD, d 11–20 (am) (n=15)	1.02 (0.87, 1.18)	1.03 (0.86, 1.22)	0.86 (0.68, 1.08)
fluconazole	200 mg QD, d 11–20 (n=29)	300 mg QD/ritonavir 100 mg QD, d 1–10 (n=19), d 11–20 (n=29)	1.03 (0.95, 1.11)	1.04 (0.95, 1.13)	0.98 (0.85, 1.13)
ketoconazole	200 mg QD, d 7–13 (n=14)	400 mg QD, d 1–13 (n=14)	0.99 (0.77, 1.28)	1.10 (0.89, 1.37)	1.03 (0.53, 2.01)
nevirapine[g,h]	200 mg BID, d 1–23 (n=23)	300 mg QD/ritonavir 100 mg QD, d 4–13, then 400 mg QD/ ritonavir 100 mg QD, d 14–23 (n=23)[i]	0.72 (0.60, 0.86) 1.02 (0.85, 1.24)	0.58 (0.48, 0.71) 0.81 (0.65, 1.02)	0.28 (0.20, 0.40) 0.41 (0.27, 0.60)
omeprazole	40 mg QD, d 7–12 (n=16)j	400 mg QD, d 1–6 (n=48), d 7–12 (n=16)	0.04 (0.04, 0.05)	0.06 (0.05, 0.07)	0.05 (0.03, 0.07)
	40 mg QD, d 11–20 (n=15)[j]	300 mg QD/ritonavir 100 mg QD, d 1–20 (n=15)	0.28 (0.24, 0.32)	0.24 (0.21, 0.27)	0.22 (0.19, 0.26)
	20 mg QD, d 17–23 (am) (n=13)	300 mg QD/ritonavir 100 mg QD, d 7–16 (pm) (n=27), d 17–23 (pm) (n=13)[k,l]	0.61 (0.46, 0.81)	0.58 (0.44, 0.75)	0.54 (0.41, 0.71)
	20 mg QD, d 17–23 (am) (n=14)	300 mg QD/ritonavir 100 mg QD, d 7–16 (am) (n=27), then 400 mg QD/ritonavir 100 mg QD, d 17–23 (am) (n=14)[m,n]	0.69 (0.58, 0.83)	0.70 (0.57, 0.86)	0.69 (0.54, 0.88)
rifabutin	150 mg QD, d 15–28 (n=7)	400 mg QD, d 1–28 (n=7)	1.34 (1.14, 1.59)	1.15 (0.98, 1.34)	1.13 (0.68, 1.87)
rifampin	600 mg QD, d 17–26 (n=16)	300 mg QD/ritonavir 100 mg QD, d 7–16 (n=48), d 17–26 (n=16)	0.47 (0.41, 0.53)	0.28 (0.25, 0.32)	0.02 (0.02, 0.03)
ritonavir[o]	100 mg QD, d 11–20 (n=28)	300 mg QD, d 1–20 (n=28)	1.86 (1.69, 2.05)	3.38 (3.13, 3.63)	11.89 (10.23, 13.82)
tenofovir[p]	300 mg QD, d 9–16 (n=34)	400 mg QD, d 2–16 (n=34)	0.79 (0.73, 0.86)	0.75 (0.70, 0.81)	0.60 (0.52, 0.68)
	300 mg QD, d 15–42 (n=10)	300 mg/ritonavir 100 mg QD, d 1–42 (n=10)	0.72[q] (0.50, 1.05)	0.75[q] (0.58, 0.97)	0.77[q] (0.54, 1.10)

a. Data provided are under fed conditions unless otherwise noted.
b. All drugs were given under fasted conditions.
c. 400 mg ddI EC and atazanavir sulfate were administered together with food on Days 8 and 19.
d. Atazanavir sulfate 300 mg plus ritonavir 100 mg once daily coadministered with famotidine 40 mg twice daily resulted in atazanavir geometric mean C_{max} that was similar and AUC and C_{min} values that were 1.79- and 4.46-fold higher relative to atazanavir sulfate 400 mg once daily alone.
e. Similar results were noted when famotidine 20 mg BID was administered 2 hours after and 10 hours before atazanavir 300 mg and ritonavir 100 mg plus tenofovir 300 mg.
f. Atazanavir/ritonavir/tenofovir was administered after a light meal.
g. Study was conducted in HIV-infected individuals.
h. Compared with atazanavir 400 mg historical data without nevirapine (n=13), the ratio of geometric means (90% confidence intervals) for C_{max}, AUC, and C_{min} were 1.42 (0.98, 2.05), 1.64 (1.11, 2.42), and 1.25 (0.66, 2.36), respectively, for atazanavir/ritonavir 300/100 mg; and 2.02 (1.42, 2.87), 2.28 (1.54, 3.38), and 1.80 (0.94, 3.45), respectively, for atazanavir/ritonavir 400/100 mg.
i. Parallel group design; n=23 for atazanavir/ritonavir plus nevirapine, n=22 for atazanavir 300 mg/ritonavir 100 mg without nevirapine. Subjects were treated with nevirapine prior to study entry.
j. Omeprazole 40 mg was administered on an empty stomach 2 hours before atazanavir sulfate.
k. Omeprazole 20 mg was administered 30 minutes prior to a light meal in the morning and atazanavir sulfate 300 mg plus ritonavir 100 mg in the evening after a light meal, separated by 12 hours from omeprazole.
l. Atazanavir sulfate 300 mg plus ritonavir 100 mg once daily separated by 12 hours from omeprazole 20 mg daily resulted in increases in atazanavir geometric mean AUC (10%) and C_{min} (2.4-fold), with a decrease in C_{max} (29%) relative to atazanavir sulfate 400 mg once daily in the absence of omeprazole (study days 1 to 6).
m. Omeprazole 20 mg was given 30 minutes prior to a light meal in the morning and atazanavir sulfate 400 mg plus ritonavir 100 mg once daily after a light meal, 1 hour after omeprazole. Effects on atazanavir concentrations were similar when atazanavir sulfate 400 mg plus ritonavir 100 mg was separated from omeprazole 20 mg by 12 hours.
n. Atazanavir sulfate 400 mg plus ritonavir 100 mg once daily administered with omeprazole 20 mg once daily resulted in increases in atazanavir geometric mean AUC (32%) and C_{min} (3.3-fold), with a decrease in C_{max} (26%) relative to atazanavir sulfate 400 mg once daily in the absence of omeprazole (study days 1 to 6).
o. Compared with atazanavir 400 mg QD historical data, administration of atazanavir/ritonavir 300/100 mg QD increased the atazanavir geometric mean values of C_{max}, AUC, and C_{min} by 18%, 103%, and 671%, respectively.
p. Note that similar results were observed in studies where administration of tenofovir and atazanavir sulfate was separated by 12 hours.
r. Ratio of atazanavir plus ritonavir plus tenofovir to atazanavir plus ritonavir. Atazanavir 300 mg plus ritonavir 100 mg results in higher atazanavir exposure than atazanavir 400 mg (see footnote[o]). The geometric mean values of atazanavir pharmacokinetic parameters when coadministered with ritonavir and tenofovir were: C_{max} = 3190 ng/mL, AUC = 34459 ng•h/mL, and C_{min} = 491 ng/mL. Study was conducted in HIV-infected individuals.

Table 17: Drug Interactions: Pharmacokinetic Parameters for Coadministered Drugs in the Presence of atazanavir sulfate[a]

Coadministered Drug	Coadministered Drug Dose/Schedule	Atazanavir sulfate Dose/Schedule	Ratio (90% Confidence Interval) of Coadministered Drug Pharmacokinetic Parameters with/without atazanavir sulfate; No Effect = 1.00		
			C_{max}	AUC	C_{min}
acetaminophen	1 gm BID, d 1-20 (n=10)	300 mg QD/ritonavir 100 mg QD, d 11-20 (n=10)	0.87 (0.77, 0.99)	0.97 (0.91, 1.03)	1.26 (1.08, 1.46)
atenolol	50 mg QD, d 7-11 (n=19) and d 19-23	400 mg QD, d 1-11 (n=19)	1.34 (1.26, 1.42)	1.25 (1.16, 1.34)	1.02 (0.88, 1.19)
clarithromycin	500 mg BID, d 7-10 (n=21) and d 18-21	400 mg QD, d 1-10 (n=21)	1.50 (1.32, 1.71) OH-clarithromycin: 0.28 (0.24, 0.33)	1.94 (1.75, 2.16) OH-clarithromycin: 0.30 (0.26, 0.34)	2.60 (2.35, 2.88) OH-clarithromycin: 0.38 (0.34, 0.42)
didanosine (ddI) (buffered tablets) plus stavudine (d4T)[b]	ddI: 200 mg x 1 dose, d4T: 40 mg x 1 dose (n=31)	400 mg x 1 dose simultaneous with ddI and d4T (n=31)	ddI: 0.92 (0.84, 1.02) d4T: 1.08 (0.96, 1.22)	ddI: 0.98 (0.92, 1.05) d4T: 1.00 (0.97, 1.03)	NA d4T: 1.04 (0.94, 1.16)
ddI (entericcoated [EC] capsules)[c]	400 mg d 1 (fasted), d 8 (fed) (n=34)	400 mg QD, d 2-8 (n=34)	0.64 (0.55, 0.74)	0.66 (0.60, 0.74)	1.13 (0.91, 1.41)
	400 mg d 1 (fasted), d 19 (fed) (n=31)	300 mg QD/ritonavir 100 mg QD, d 9-19 (n=31)	0.62 (0.52, 0.74)	0.66 (0.59, 0.73)	1.25 (0.92, 1.69)
diltiazem	180 mg QD, d 7-11 (n=28) and d 19–23	400 mg QD, d 1-11 (n=28)	1.98 (1.78, 2.19) desacetyl-diltiazem: 2.72 (2.44, 3.03)	2.25 (2.09, 2.16) desacetyl-diltiazem: 2.65 (2.45, 2.87)	2.42 (2.14, 2.73) desacetyl-diltiazem: 2.21 (2.02, 2.42)
ethinyl estradiol & norethindrone[d]	Ortho-Novum® 7/7/7 QD, d 1-29 (n=19)	400 mg QD, d 16-29 (n=19)	ethinyl estradiol: 1.15 (0.99, 1.32) norethindrone: 1.67 (1.42, 1.96)	ethinyl estradiol: 1.48 (1.31, 1.68) norethindrone: 2.10 (1.68, 2.62)	ethinyl estradiol: 1.91 (1.57, 2.33) norethindrone: 3.62 (2.57, 5.09)
ethinyl estradiol & norgestimate	Ortho Tri-Cyclen® QD, d 1-28 (n=18), then Ortho Tri-Cyclen® LO QD, d 29-42[f] (n=14)	300 mg QD/ritonavir 100 mg QD, d 29–42 (n=14)	ethinyl estradiol: 0.84 (0.74, 0.95) 17-deacetyl norgestimate:[g] 1.68 (1.51, 1.88)	ethinyl estradiol: 0.81 (0.75, 0.87) 17-deacetyl norgestimate:[g] 1.85 (1.67, 2.05)	ethinyl estradiol: 0.63 (0.55, 0.71) 17-deacetyl norgestimate:[g] 2.02 (1.77, 2.31)
fluconazole	200 mg QD, d 1-10 (n=11) and 200 mg QD, d 11-20 (n=29)	300 mg QD/ritonavir 100 mg QD, d 11-20 (n=29)	1.05 (0.99, 1.10)	1.08 (1.02, 1.15)	1.07 (1.00, 1.15)
methadone	Stable maintenance dose, d 1-15 (n=16)	400 mg QD, d 2-15 (n=16)	(R)-methadone[h] 0.91 (0.84, 1.0) total: 0.85 (0.78, 0.93)	(R)-methadone[h] 1.03 (0.95, 1.10) total: 0.94 (0.87, 1.02)	(R)-methadone[h] 1.11 (1.02, 1.20) total: 1.02 (0.93, 1.12)
nevirapine[i,j]	200 mg BID, d 1-23 (n=23)	300 mg QD/ ritonavir 100 mg QD, d 4-13, then	1.17 (1.09, 1.25)	1.25 (1.17, 1.34)	1.32 (1.22, 1.43)
		400 mg QD/ ritonavir 100 mg QD, d 14-23 (n=23)	1.21 (1.11, 1.32)	1.26 (1.17, 1.36)	1.35 (1.25, 1.47)
omeprazole[k]	40 mg single dose, d 7 and d 20 (n=16)	400 mg QD, d 1-12 (n=16)	1.24 (1.04, 1.47)	1.45 (1.20, 1.76)	NA
rifabutin	300 mg QD, d 1-10 then 150 mg QD, d 11-20 (n=3)	600 mg QD[l] d 11-20 (n=3)	1.18 (0.94, 1.48) 25-O-desacetylrifabutin: 8.20 (5.90, 11.40)	2.10 (1.57, 2.79) 25-O-desacetylrifabutin: 22.01 (15.97, 30.34)	3.43 (1.98, 5.96) 25-O-desacetylrifabutin: 75.6 (30.1, 190.0)
	150 mg twice weekly, d 1-15 (n=7)	300 mg QD/ritonavir 100 mg QD, d 1-17 (n=7)	2.49[m] (2.03, 3.06) 25-O-desacetylrifabutin: 7.77 (6.13,9.83)	1.48[m] (1.19, 1.84) 25-O-desacetylrifabutin: 10.90 (8.14, 14.61)	1.40[m] (1.05, 1.87) 25-O-desacetylrifabutin: 11.45 (8.15,16.10)
rosiglitazone[n]	4 mg single dose, d 1, 7, 17 (n=14)	400 mg QD, d 2-7, then 300 mg QD/ ritonavir 100 mg QD, d 8-17 (n=14)	1.08 (1.03, 1.13) 0.97 (0.91, 1.04)	1.35 (1.26, 1.44) 0.83 (0.77, 0.89)	NA NA
Saquinavir[o] (soft gelatin capsules)	1200 mg QD, d 1-13 (n=7)	400 mg QD, d 7-13 (n=7)	4.39 (3.24, 5.95)	5.49 (4.04, 7.47)	6.86 (5.29, 8.91)
tenofovir[p]	300 mg QD, d 9-16 (n=33) and d 24-30 (n=33)	400 mg QD, d 2-16 (n=33)	1.14 (1.08, 1.20)	1.24 (1.21, 1.28)	1.22 (1.15, 1.30)
	300 mg QD, d 1-7 (pm) (n=14) d 25-34 (pm) (n=12)	300 mg QD/ritonavir 100 mg QD, d 25-34 (am) (n=12)[q]	1.34 (1.20, 1.51)	1.37 (1.30, 1.45)	1.29 (1.21, 1.36)
lamivudine + zidovudine	150 mg lamivudine + 300 mg zidovudine BID, d 1-12 (n=19)	400 mg QD, d 7-12 (n=19)	lamivudine: 1.04 (0.92, 1.16) zidovudine: 1.05 (0.88, 1.24) zidovudine glucuronide: 0.95 (0.88, 1.02)	lamivudine: 1.03 (0.98, 1.08) zidovudine: 1.05 (0.96, 1.14) zidovudine glucuronide: 1.00 (0.97, 1.03)	lamivudine: 1.12 (1.04, 1.21) zidovudine: 0.69 (0.57, 0.84) zidovudine glucuronide: 0.82 (0.62, 1.08)

a. Data provided are under fed conditions unless otherwise noted.
b. All drugs were given under fasted conditions.
c. 400 mg ddI EC and atazanavir sulfate were administered together with food on Days 8 and 19.
d. Upon further dose normalization of ethinyl estradiol 25 mcg with atazanavir relative to ethinyl estradiol 35 mcg without atazanavir, the ratio of geometric means (90% confidence intervals) for C_{max}, AUC, and C_{min} were 0.82 (0.73, 0.92), 1.06 (0.95, 1.17), and 1.35 (1.11, 1.63), respectively.
e. Upon further dose normalization of ethinyl estradiol 35 mcg with atazanavir/ritonavir relative to ethinyl estradiol 25 mcg without atazanavir/ritonavir, the ratio of geometric means (90% confidence intervals) for C_{max}, AUC, and C_{min} were 1.17 (1.03, 1.34), 1.13 (1.05, 1.22), and 0.88 (0.77, 1.00), respectively.
f. All subjects were on a 28 day lead-in period; one full cycle of Ortho Tri-Cyclen®. Ortho Tri-Cyclen® contains 35 mcg of ethinyl estradiol. Ortho Tri-Cyclen® LO contains 25 mcg of ethinyl estradiol. Results were dose normalized to an ethinyl estradiol dose of 35 mcg.
g. 17-deacetyl norgestimate is the active component of norgestimate.
h. (R)-methadone is the active isomer of methadone.
i. Study was conducted in HIV-infected individuals.
j. Subjects were treated with nevirapine prior to study entry.
k. Omeprazole was used as a metabolic probe for CYP2C19. Omeprazole was given 2 hours after atazanavir sulfate on Day 7; and was given alone 2 hours after a light meal on Day 20.
l. Not the recommended therapeutic dose of atazanavir.
m. When compared to rifabutin 150 mg QD alone d 1-10 (n=14). Total of rifabutin + 25-O-desacetyl-rifabutin: AUC 2.19 (1.78,2.69)
n. Rosiglitazone used as a probe substrate for CYP2C8.
o. The combination of atazanavir and saquinavir 1200 mg QD produced daily saquinavir exposures similar to the values produced by the standard therapeutic dosing of saquinavir at 1200 mg TID. However, the C_{max} is about 79% higher than that for the standard dosing of saquinavir (soft gelatin capsules) alone at 1200 mg TID.
p. Note that similar results were observed in a study where administration of tenofovir and atazanavir sulfate was separated by 12 hours.
q. Administration of tenofovir and atazanavir sulfate was temporally separated by 12 hours.
NA = not available.

12.4 Microbiology

Mechanism of Action

Atazanavir (ATV) is an azapeptide HIV-1 protease inhibitor (PI). The compound selectively inhibits the virus-specific processing of viral Gag and Gag-Pol polyproteins in HIV-1 infected cells, thus preventing formation of mature virions.

Antiviral Activity in Cell Culture

Atazanavir exhibits anti-HIV-1 activity with a mean 50% effective concentration (EC_{50}) in the absence of human serum of 2 to 5 nM against a variety of laboratory and clinical HIV-1 isolates grown in peripheral blood mononuclear cells, macrophages, CEM-SS cells, and MT-2 cells. ATV has activity against HIV-1 Group M subtype viruses A, B, C, D, AE, AG, F, G, and J isolates in cell culture. ATV has variable activity against HIV-2 isolates (1.9 to 32 nM), with EC_{50} values above the EC_{50} values of failure isolates. Two-drug combination antiviral activity studies with ATV showed no antagonism in cell culture with NNRTIs (delavirdine, efavirenz, and nevirapine), PIs (amprenavir, indinavir, lopinavir, nelfinavir, ritonavir, and saquinavir), NRTIs (abacavir, didanosine, emtricitabine, lamivudine, stavudine, tenofovir, zalcitabine, and zidovudine), the HIV-1 fusion inhibitor enfuvirtide, and two compounds used in the treatment of viral hepatitis, adefovir and ribavirin, without enhanced cytotoxicity.

Resistance

In Cell Culture: HIV-1 isolates with a decreased susceptibility to ATV have been selected in cell culture and obtained from patients treated with ATV or atazanavir/ritonavir (ATV/RTV). HIV-1 isolates with 93- to 183-fold reduced susceptibility to ATV from three different viral strains were selected in cell culture by 5 months. The substitutions in these HIV-1 viruses that contributed to ATV resistance include I50L, N88S, I84V, A71V, and M46I. Changes were also observed at the protease cleavage sites following drug selection. Recombinant viruses containing the I50L substitution without other major PI substitutions were growth impaired and displayed increased susceptibility in cell culture to other PIs (amprenavir, indinavir, lopinavir, nelfinavir, ritonavir, and saquinavir). The I50L and I50V substitutions yielded selective resistance to ATV and amprenavir, respectively, and did not appear to be cross-resistant.

Clinical Studies of Treatment-Naive Patients: Comparison of Ritonavir-Boosted atazanavir sulfate vs. Unboosted atazanavir sulfate: Study AI424-089 compared atazanavir sulfate 300 mg once daily with ritonavir 100 mg vs. atazanavir sulfate 400 mg once daily when administered with lamivudine and extended-release stavudine in HIV-infected treatment-naive patients. A summary of the number of virologic failures and virologic failure isolates with ATV resistance in each arm is shown in Table 18.

Table 18: Summary of Virologic Failures[a] at Week 96 in Study AI424-089: Comparison of Ritonavir Boosted atazanavir sulfate vs. Unboosted atazanavir sulfate: Randomized Patients

	Atazanavir sulfate 300 mg + ritonavir 100 mg (n=95)	Atazanavir sulfate 400 mg (n=105)
Virologic Failure (≥50 copies/mL) at Week 96	15 (16%)	34 (32%)
Virologic Failure with Genotypes and Phenotypes Data	5	17
Virologic Failure Isolates with ATV-resistance at Week 96	0/5 (0%)[b]	4/17 (24%)[b]
Virologic Failure Isolates with I50L Emergence at Week 96[c]	0/5 (0%)[b]	2/17 (12%)[b]
Virologic Failure Isolates with Lamivudine Resistance at Week 96	2/5 (40%)[b]	11/17 (65%)[b]

a. Virologic failure includes patients who were never suppressed through Week 96 and on study at Week 96, had virologic rebound or discontinued due to insufficient viral load response.
b. Percentage of Virologic Failure Isolates with genotypic and phenotypic data.
c. Mixture of I50I/L emerged in 2 other ATV 400 mg-treated patients. Neither isolate was phenotypically resistant to ATV.

Clinical Studies of Treatment-Naive Patients Receiving atazanavir sulfate 300 mg With Ritonavir 100 mg: In Phase III study AI424-138, an as-treated genotypic and phenotypic analysis was conducted on samples from patients who experienced virologic failure (HIV-1 RNA ≥400 copies/mL) or discontinued before achieving suppression on ATV/RTV (n=39; 9%) and LPV/RTV (n=39; 9%) through 96 weeks of treatment. In the ATV/RTV arm, 1 of the virologic failure isolates had a 56-fold decreases in ATV susceptibility emerge on therapy with the development of PI resistance associated substitutions L10F, V32I, K43T, M46I, A71I, G73S, I85I/V, and L90M. The NRTI resistance-associated substitution M184V also emerged on treatment in this isolate conferring emtricitabine resistance. Two ATV/RTV-virologic failure isolates had baseline phenotypic ATV resistance and IAS-defined major PI resistance-associated substitutions at baseline. The I50L substitution emerged on study in one of these failure isolates and was associated with a 17-fold decrease in ATV susceptibility from baseline and the other failure isolate with baseline ATV resistance and PI substitutions (M46M/I and I84I/V) had additional IAS-defined major PI substitutions (v321, M46I, and I84V) emerge on ATV treatment associated with a 3-fold decrease in ATV susceptibility from baseline. Five of the treatment failure isolates in the ATV/RTV arm developed phenotypic emtricitabine resistance with the emergence of either the M184I (n=1) or the M184V (n=4) substitution on therapy and none developed phenotypic tenofovir disoproxil resistance. In the LPV/RTV arm, one of the virologic failure patient isolates had a 69-fold decrease in LPV susceptibility emerge on therapy with the development of PI substitutions L10V, V11I, I54V, G73S, and V82A in addition to baseline PI substitutuions L10L/I, V321, I54I/V, A711, G73G/S, V82V/A, L89V, and L90M. Six LPV/RTV virologic failure isolates developed the M184V substitution and phenotypic emtricitabine resistance and two developed phenotypic tenofovir disoproxil resistance.

Clinical Studies of Treatment-Naive Patients Receiving atazanavir sulfate 400 mg Without Ritonavir: ATV-resistant clinical isolates from treatment-naive patients who experienced virologic failure on atazanavir sulfate 400 mg treatment without ritonavir often developed an I50L substitution (after an average of 50 weeks of ATV therapy), often in combination with an A71V substitution, but also developed one or more other PI substitutions (eg, V32I, L33F, G73S, V82A, I85V, or N88S) with or without the I50L substitution. In treatment-naive patients, viral isolates that developed the I50L substitution, without other major PI substitutions, showed phenotypic resistance to ATV but retained in cell culture susceptibility to other PIs (amprenavir, indinavir, lopinavir, nelfinavir, ritonavir, and saquinavir); however, there are no clinical data available to demonstrate the effect of the I50L substitution on the efficacy of subsequently administered PIs.

Clinical Studies of Treatment-Experienced Patients: In studies of treatment-experienced patients treated with ATV or ATV/RTV, most ATV-resistant isolates from patients who experienced virologic failure developed substitutions that were associated with resistance to multiple PIs and displayed decreased susceptibility to multiple PIs. The most common protease substitutions to develop in the viral isolates of patients who failed treatment with ATV 300 mg once daily and RTV 100 mg once daily (together with tenofovir and an NRTI) included V32I, L33F/V/I, E35D/G, M46I/L, I50L, F53L/V, I54V, A71V/T/I, G73S/T/C, V82A/T/L, I85V, and L89V/Q/M/T. Other substitutions that developed on ATV/RTV treatment including E34K/A/Q, G48V, I84V, N88S/D/T, and L90M occurred in less than 10% of patient isolates. Generally, if multiple PI resistance substitutions were present in the HIV-1 virus of the patient at baseline, ATV resistance developed through substitutions associated with resistance to other PIs and could include the development of the I50L substitution. The I50L substitution has been detected in treatment-experienced patients experiencing virologic failure after long-term treatment. Protease cleavage site changes also emerged on ATV treatment but their presence did not correlate with the level of ATV resistance.

Cross-Resistance

Cross-resistance among PIs has been observed. Baseline phenotypic and genotypic analyses of clinical isolates from ATV clinical trials of PI-experienced patients showed that isolates cross-resistant to multiple PIs were cross-resistant to ATV. Greater than 90% of the isolates with substitutions that included I84V or G48V were resistant to ATV. Greater than 60% of isolates containing L90M, G73S/T/C, A71V/T, I54V, M46I/L, or a change at V82 were resistant to ATV, and 38% of isolates containing a D30N substitution in addition to other changes were resistant to ATV. Isolates resistant to ATV were also cross-resistant to other PIs with >90% of the isolates resistant to indinavir, lopinavir, nelfinavir, ritonavir, and saquinavir, and 80% resistant to amprenavir. In treatment-experienced patients, PI-resistant viral isolates that developed the I50L substitution in addition to other PI resistance-associated substitutions were also cross-resistant to other PIs.

Baseline Genotype/Phenotype and Virologic Outcome Analyses

Genotypic and/or phenotypic analysis of baseline virus may aid in determining ATV susceptibility before initiation of ATV/RTV therapy. An association between virologic response at 48 weeks and the number and type of primary PI resistance-associated substitutions detected in baseline HIV-1 isolates from antiretroviral-experienced patients receiving ATV/RTV once daily or lopinavir (LPV)/RTV twice daily in Study AI424-045 is shown in Table 19.

Overall, both the number and type of baseline PI substitutions affected response rates in treatment-experienced patients. In the ATV/RTV group, patients had lower response rates when 3 or more baseline PI substitutions, including a substitution at position 36, 71, 77, 82, or 90, were present compared to patients with 1 to 2 PI substitutions, including one of these substitutions.

Table 19: HIV RNA Response by Number and Type of Baseline PI Substitution, Antiretroviral-Experienced Patients in Study AI424-045, As-Treated Analysis

Number and Type of Baseline PI Substitutions[a]	Virologic Response = HIV ATV/RTV (n=110)	RNA <400 copies/mL[b] LPV/RTV (n=113)
3 or more primary PI substitutions including:[c]		
D30N	75% (6/8)	50% (3/6)
M36I/V	19% (3/16)	33% (6/18)
M46I/L/T	24% (4/17)	23% (5/22)
I54V/L/T/M/A	31% (5/16)	31% (5/16)
A71V/T/I/G	34% (10/29)	39% (12/31)
G73S/A/C/T	14% (1/7)	38% (3/8)
V77I	47% (7/15)	44% (7/16)
V82A/F/T/S/I	29% (6/21)	27% (7/26)
I84V/A	11% (1/9)	33% (2/6)
N88D	63% (5/8)	67% (4/6)
L90M	10% (2/21)	44% (11/25)
Number of baseline primary PI substitutions[a]		
All patients, as-treated	58% (64/110)	59% (67/113)
0–2 PI substitutions	75% (50/67)	75% (50/67)
3–4 PI substitutions	41% (14/34)	43% (12/28)
5 or more PI substitutions	0% (0/9)	28% (5/18)

a. Primary substitutions include any change at D30, V32, M36, M46, I47, G48, I50, I54, A71, G73, V77, V82, I84, N88, and L90.
b. Results should be interpreted with caution because the subgroups were small.
c. There were insufficient data (n<3) for PI substitutions V32I, I47V, G48V, I50V, and F53L.

The response rates of antiretroviral-experienced patients in Study AI424-045 were analyzed by baseline phenotype (shift in susceptibility in cell culture relative to reference, Table 20). The analyses are based on a select patient population with 62% of patients receiving an NNRTI-based regimen before study entry compared to 35% receiving a PI-based regimen. Additional data are needed to determine clinically relevant break points for atazanavir sulfate.

Table 20: Baseline Phenotype by Outcome, Antiretroviral-Experienced Patients in Study AI424-045, As-Treated Analysis

	Virologic Response = HIV	RNA <400 copies/mL[b]
Baseline Phenotype[a]	ATV/RTV (n=111)	LPV/RTV (n=111)
0–2	71% (55/78)	70% (56/80)
>2–5	53% (8/15)	44% (4/9)
>5–10	13% (1/8)	33% (3/9)
>10	10% (1/10)	23% (3/13)

a. Fold change susceptibility in cell culture relative to the wild-type reference.
b. Results should be interpreted with caution because the subgroups were small.

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Two-year carcinogenicity studies in mice and rats were conducted with atazanavir. At the high dose in female mice, the incidence of benign hepatocellular adenomas was increased at systemic exposures 7.2-fold higher than those in humans at the recommended 400-mg clinical dose. There were no increases in the incidence of tumors in male mice at any dose in the study. In rats, no significant positive trends in the incidence of neoplasms occurred at systemic exposures up to 5.7-fold higher than those in humans at the recommended 400-mg clinical dose. The clinical relevance of the carcinogenic findings in female mice is unknown.

Atazanavir tested positive in an *in vitro* clastogenicity test using primary human lymphocytes, in the absence and presence of metabolic activation. Atazanavir tested negative in the *in vitro* Ames reverse-mutation assay, *in vivo* micronucleus and DNA repair tests in rats, and *in vivo* DNA damage test in rat duodenum (comet assay).

13.2 Reproductive Toxicology Studies

At the systemic drug exposure levels (AUC) equal to (in male rats) or two times (in female rats) those at the human clinical dose (400 mg once daily), atazanavir did not produce significant effects on mating, fertility, or early embryonic development.

14 CLINICAL STUDIES

14.1 Adult Patients Without Prior Antiretroviral Therapy

Study AI424-138: a 96-week study comparing the antiviral efficacy and safety of atazanavir/ritonavir with lopinavir/ritonavir, each in combination with fixed-dose tenofovir-emtricitabine in HIV-1 infected treatment naive subjects. Study AI424-138 is a 96-week open-label, randomized, multicenter study, comparing atazanavir sulfate (300 mg once daily) with ritonavir (100 mg once daily) to lopinavir with ritonavir (400/100 mg twice daily), each in combination with fixed-dose tenofovir with emtricitabine (300/200 mg once daily), in 878 antiretroviral treatment-naive treated patients. Patients had a mean age of 36 years (range: 19 to 72), 49% were Caucasian, 18% Black, 9% Asian, 23% Hispanic/Mestizo/mixed race, and 68% were male. The median baseline plasma CD4+ cell count was 204 cells/mm³ (range: 2 to 810 cells/mm³) and the mean baseline plasma HIV-1 RNA level was 4.94 log_{10} copies/mL (range: 2.60 to 5.88 log_{10} copies/mL). Treatment response and outcomes through Week 96 are presented in Table 21.

Table 21: Outcomes of Treatment Through Week 96 (Study AI424-138)

Outcome	Atazanavir sulfate 300 mg + ritonavir 100 mg (once daily) with tenofovir/emtricitabine (once daily)[a] (n=441) 96 Weeks	lopinavir 400 mg + ritonavir 100 mg (twice daily) with tenofovir/emtricitabine (once daily)[a] Outcome (n=437) 96 Weeks
Responder[b,c,d]	75%	68%
Virologic failure[e]	17%	19%
Rebound	8%	10%
Never suppressed through Week 96	9%	9%
Death	1%	1%
Discontinued due to adverse event	3%	5%
Discontinued for other reasons[f]	4%	7%

a. As a fixed-dose combination: 300 mg tenofovir, 200 mg emtricitabine once daily.
b. Patients achieved confirmed HIV RNA <50 copies/mL at Week 96. Roche Amplicor®, v1.5 ultra-sensitive assay.
c. Pre-specified ITT analysis at week 48 using as-randomized cohort: ATV/RTV 78% and LPV/RTV 76% [difference estimate: 1.7% (95% confidence interval: −3.8%, 7.1%)].
d. Pre-specified ITT analysis at Week 96 using as-randomized cohort: ATV/RTV 74% and LPV/RTV 68% [difference estimate: 6.1% ((95% confidence interval: 0.3%, 12.0%)].
e. Includes viral rebound and failure to achieve confirmed HIV RNA <50 copies/mL through Week 96.
f. Includes lost to follow-up, patient's withdrawal, noncompliance, protocol violation, and other reasons.

Through 96 weeks of therapy, the proportion of responders among patients with high viral loads (ie, baseline HIV RNA ≥100,000 copies/mL) was comparable for the atazanavir sulfate/ritonavir (165 of 223 patients, 74%) and lopinavir/ritonavir (148 of 222 patients, 67%) arms. At 96 weeks the median increase from baseline in CD4+ cell count was 261 cells/mm³ for the atazanavir sulfate/ritonavir arm and 273 cells/mm³ for the lopinavir/ritonavir arm.

Study AI424-034: atazanavir sulfate once daily compared to efavirenz once daily, each in combination with fixed-dose lamivudine + zidovudine twice daily. Study AI424-034 was a randomized, double-blind, multicenter trial comparing atazanavir sulfate (400 mg once daily) to efavirenz (600 mg once daily), each in combination with a fixed-dose combination of lamivudine (3TC) (150 mg) and zidovudine (ZDV) (300 mg) given twice daily, in 810 antiretroviral treatment-naive patients. Patients had a mean age of 34 years (range: 18 to 73), 36% were Hispanic, 33% were Caucasian, and 65% were male. The mean baseline CD4+ cell count was 321 cells/mm³ (range: 64 to 1424 cells/mm³) and the mean baseline plasma HIV-1 RNA level was 4.8 log_{10} copies/mL (range: 2.2 to 5.9 log_{10} copies/mL). Treatment response and outcomes through Week 48 are presented in Table 22.

Table 22: Outcomes of Randomized Treatment Through Week 48 (Study AI424-034)

Outcome	Atazanavir sulfate 400 mg once daily + lamivudine + zidovudine[d] (n=405)	efavirenz 600 mg once daily + lamivudine + zidovudine[d] Outcome (n=405)
Responder[a]	67% (32%)	62% (37%)
Virologic failure[b]	20%	21%
Rebound	17%	16%
Never suppressed through Week 48	3%	5%
Death	–	<1%
Discontinued due to adverse event	5%	7%
Discontinued for other reasons[c]	8%	10%

a. Patients achieved and maintained confirmed HIV RNA <400 copies/mL (<50 copies/mL) through Week 48. Roche Amplicor® HIV-1 Monitor™ Assay, test version 1.0 or 1.5 as geographically appropriate.
b. Includes viral rebound and failure to achieve confirmed HIV RNA <400 copies/mL through Week 48.
c. Includes lost to follow-up, patient's withdrawal, noncompliance, protocol violation, and other reasons.
d. As a fixed-dose combination: 150 mg lamivudine, 300 mg zidovudine twice daily.

Through 48 weeks of therapy, the proportion of responders among patients with high viral loads (ie, baseline HIV RNA ≥100,000 copies/mL) was comparable for the atazanavir sulfate and efavirenz arms. The mean increase from baseline in CD4+ cell count was 176 cells/mm³ for the atazanavir sulfate arm and 160 cells/mm³ for the efavirenz arm.

Study AI424-008 was a 48-week, randomized, multicenter trial, blinded to dose of atazanavir sulfate, comparing atazanavir sulfate at two dose levels (400 mg and 600 mg once daily) to nelfinavir (1250 mg twice daily), each in combination with stavudine (40 mg) and lamivudine (150 mg) given twice daily, in 467+ antiretroviral treatment-naive patients. Patients had a mean age of 35 years (range: 18 to 69), 55% were Caucasian, and 63% were male. The mean baseline CD4+ cell count was 295 cells/mm³ (range: 4 to 1003 cells/mm³) and the mean baseline plasma HIV-1 RNA level was 4.7 log_{10} copies/mL (range: 1.8 to 5.9 log_{10} copies/mL). Treatment response and outcomes through Week 48 are presented in Table 23.

Table 23: Outcomes of Randomized Treatment Through Week 48 (Study AI424-008)

Outcome	Atazanavir sulfate 400 mg once daily + lamivudine + stavudine (n=181)	nelfinavir 1250 mg twice daily + lamivudine + stavudine (n=91)
Responder[a]	67% (33%)	59% (38%)
Virologic failure[b]	24%	27%
Rebound	14%	14%
Never suppressed through Week 48	10%	13%
Death	<1%	–
Discontinued due to adverse event	1%	3%
Discontinued for other reasons[c]	7%	10%

a. Patients achieved and maintained confirmed HIV RNA <400 copies/mL (<50 copies/mL) through Week 48. Roche Amplicor® HIV-1 Monitor ™ Assay, test version 1.0 or 1.5 as geographically appropriate.
b. Includes viral rebound and failure to achieve confirmed HIV RNA <400 copies/mL through Week 48.
c. Includes lost to follow-up, patient's withdrawal, noncompliance, protocol violation, and other reasons.

Through 48 weeks of therapy, the mean increase from baseline in CD4+ cell count was 234 cells/mm³ for the atazanavir sulfate 400 mg arm and 211 cells/mm³ for the nelfinavir arm.

14.2 Adult Patients With Prior Antiretroviral Therapy

Study AI424-045: Atazanavir sulfate once daily + ritonavir once daily compared to atazanavir sulfate once daily + saquinavir (soft gelatin capsules) once daily, and compared to lopinavir + ritonavir twice daily, each in combination with tenofovir + one NRTI. Study AI424-045 is an ongoing, randomized, multicenter trial comparing atazanavir sulfate (300 mg once daily) with ritonavir (100 mg once daily) to atazanavir sulfate (400 mg once daily) with saquinavir soft gelatin capsules (1200 mg once daily), and to lopinavir + ritonavir (400/100 mg twice daily), each in combination with tenofovir and one NRTI, in 347 (of 358 randomized) patients who experienced virologic failure on HAART regimens containing PIs, NRTIs, and NNRTIs. The mean time of prior exposure to antiretrovirals was 139 weeks for PIs, 283 weeks for NRTIs, and 85 weeks for NNRTIs. The mean age was 41 years (range: 24 to 74); 60% were Caucasian, and 78% were male. The mean baseline CD4+ cell count was 338 cells/mm³ (range: 14 to 1543 cells/mm³) and the mean baseline plasma HIV-1 RNA level was 4.4 log_{10} copies/mL (range: 2.6 to 5.88 log_{10} copies/mL).

Treatment outcomes through Week 48 for the atazanavir sulfate/ritonavir and lopinavir/ritonavir treatment arms are presented in Table 24. Atazanavir sulfate/ritonavir and lopinavir/ritonavir were similar for the primary efficacy outcome measure of time-averaged difference in change from baseline in HIV RNA level. Study AI424-045 was not large enough to reach a definitive conclusion that atazanavir sulfate/ritonavir and lopinavir/ritonavir are equivalent on the secondary efficacy outcome measure of proportions below the HIV RNA lower limit of detection. [See *Clinical Pharmacology, Tables 19* and *20 (12.4).*]

Table 24: Outcomes of Treatment Through Week 48 in Study AI424-045 (Patients with Prior Antiretroviral Experience)

	Atazanavir sulfate 300 mg + ritonavir 100 mg once daily + tenofovir + 1 NRTI	lopinavir/ritonavir (400/100 mg) twice daily + tenofovir + 1 NRTI	Difference[a] (atazanavir sulfate lopinavir/ ritonavir)
Outcome	(n=119)	(n=118)	(CI)
HIV RNA Change from Baseline (log_{10} copies/mL)[b]	−1.58	−1.70	+0.12[c] (−0.17, 0.41)
CD4+ Change from Baseline (cells/mm³)[d]	116	123	−7 (−67, 52)
Percent of Patients Responding[e]			
HIV RNA <400 copies/mL[b]	55%	57%	−2.2% (−14.8%, 10.5%)
HIV RNA <50 copies/mL[b]	38%	45%	−7.1% (−19.6%, 5.4%)

a. Time-averaged difference through Week 48 for HIV RNA; Week 48 difference in HIV RNA percentages and CD4+ mean changes, atazanavir sulfate/ritonavir vs lopinavir/ritonavir; CI = 97.5% confidence interval for change in HIV RNA; 95% confidence interval otherwise.
b. Roche Amplicor® HIV-1 Monitor™ Assay, test version 1.5.
c. Protocol-defined primary efficacy outcome measure.
d. Based on patients with baseline and Week 48 CD4+ cell count measurements (atazanavir sulfate/ritonavir, n=85; lopinavir/ritonavir, n=93).
e. Patients achieved and maintained confirmed HIV-1 RNA <400 copies/mL (<50 copies/mL) through Week 48.

No patients in the atazanavir sulfate/ritonavir treatment arm and three patients in the lopinavir/ritonavir treatment arm experienced a new-onset CDC Category C event during the study.

In Study AI424-045, the mean change from baseline in plasma HIV-1 RNA for atazanavir sulfate 400 mg with saquinavir (n=115) was −1.55 log_{10} copies/mL, and the time-averaged difference in change in HIV-1 RNA levels versus lopinavir/ritonavir was 0.33. The corresponding mean increase in CD4+ cell count was 72 cells/mm³. Through 48 weeks of treatment, the proportion of patients in this treatment arm with plasma HIV-1 RNA <400 (<50) copies/mL was 38% (26%). In this study, coadministration of atazanavir sulfate and saquinavir did not provide adequate efficacy [see *Drug Interactions (7)*].

Study AI424-045 also compared changes from baseline in lipid values. [See *Adverse Reactions (6.1).*]

Study AI424-043: Study AI424-043 was a randomized, open-label, multicenter trial comparing atazanavir sulfate (400 mg once daily) to lopinavir/ritonavir (400/100 mg twice daily), each in combination with two NRTIs, in 300 patients who experienced virologic failure to only one prior PI-containing regimen. Through 48 weeks, the proportion of patients with plasma HIV-1 RNA <400 (<50) copies/mL was 49% (35%) for patients randomized to atazanavir sulfate (n=144) and 69% (53%) for patients randomized to lopinavir/ritonavir (n=146). The mean change from baseline was −1.59 log_{10} copies/mL in the atazanavir sulfate treatment arm and −2.02 log_{10} copies/mL in the lopinavir/ritonavir arm. Based on the results of this study, atazanavir sulfate without ritonavir is inferior to lopinavir/ritonavir in PI-experienced patients with prior virologic failure and is not recommended for such patients.

14.3 Pediatric Patients

Assessment of the pharmacokinetics, safety, tolerability, and efficacy of atazanavir sulfate is based on data from the open-label, multicenter clinical trial PACTG 1020A conducted in patients from 3 months to 21 years of age. In this study, 182 patients (83 antiretroviral-naive and 99 antiretroviral-experienced) received once daily atazanavir sulfate, with or without ritonavir, in combination with two NRTIs.

Ninety-nine patients (6 to less than 18 years of age) treated with the atazanavir sulfate capsule formulation, with or without ritonavir, were evaluated. In this cohort, the overall proportions of antiretroviral-naive and -experienced patients with HIV RNA <400 copies/mL at week 24 were 68% (28/41) and 33% (19/58), respectively. The overall proportions of antiretroviral-naive and -experienced patients with HIV RNA <50 copies/mL at week 24 were 59% (24/41) and 24% (14/58), respectively. The median increase from baseline in absolute CD4 count at 20 weeks of therapy was 171 cells/mm³ in antiretroviral-naive patients and 116 cells/mm³ in antiretroviral experienced patients.

16. HOW SUPPLIED/STORAGE AND HANDLING

Atazanavir sulfate capsules are available in the following strengths and configurations of plastic bottles with child-resistant closures.

Atazanavir sulfate capsules 150 mg:

- Capsules with light sky blue opaque color cap and light sky blue opaque color body imprinted with "M166" on both cap and body in black ink. They are supplied as follows:
  30's HDPE Bottle NDC 65015-087-14

Atazanavir sulfate capsules 300 mg:

- Capsules with blue opaque color cap and light sky blue opaque color body imprinted with "M167" on both cap and body in black ink
  30's HDPE Bottle NDC 65015-088-14

Atazanavir Sulfate Capsules should be stored at 25°C (77°F); excursions permitted to 15–30°C (59–86°F) [see USP Controlled Room Temperature].

17. PATIENT COUNSELING INFORMATION

A statement to patients and healthcare providers is included on the product's bottle label: **ALERT: Find out about medicines that should NOT be taken with atazanavir sulfate.** FDA-Approved Patient Labeling is available for atazanavir sulfate.

Patients should be informed that atazanavir sulfate is not a cure for HIV infection and that they may continue to develop opportunistic infections and other complications associated with HIV disease. Patients should be told that there are currently no data demonstrating that therapy with atazanavir sulfate can reduce the risk of transmitting HIV to others through sexual contact.

17.1 Dosing Instructions

Patients should be told that sustained decreases in plasma HIV RNA have been associated with a reduced risk of progression to AIDS and death. Patients should remain under the care of a physician while using atazanavir sulfate. Patients should be advised to take atazanavir sulfate with food every day and take other concomitant antiretroviral therapy as prescribed. Atazanavir sulfate must always be used in combination with other antiretroviral drugs. Patients should not alter the dose or discontinue therapy without consulting with their doctor. If a dose of atazanavir sulfate is missed, patients should take the dose as soon as possible and then return to their normal schedule. However, if a dose is skipped the patient should not double the next dose.

17.2 Drug Interactions

Atazanavir sulfate may interact with some drugs; therefore, patients should be advised to report to their doctor the use of any other prescription, nonprescription medication, or herbal products, particularly St. John's wort.

Patients receiving a PDE5 inhibitor and atazanavir should be advised that they may be at an increased risk of PDE5 inhibitor-associated adverse events including hypotension, syncope, visual disturbances, and priapism, and should promptly report any symptoms to their doctor.

Patients should be informed that REVATIO® (used to treat pulmonary arterial hypertension) is contraindicated with atazanavir sulfate and that dose adjustments are necessary when atazanavir sulfate is used with CIALIS®, LEVITRA® or VIAGRA® (used to treat erectile dysfunction), or ADCIRCA® (used to treat pulmonary arterial hypertension).

17.3 Cardiac Conduction Abnormalities

Patients should be informed that atazanavir may produce changes in the electrocardiogram (eg, PR prolongation). Patients should consult their physician if they are experiencing symptoms such as dizziness or lightheadedness.

17.4 Rash

Patients should be informed that mild rashes without other symptoms have been reported with atazanavir sulfate use. These rashes go away within two weeks with no change in treatment. However, there have been a few reports of severe skin reactions (eg, Stevens-Johnson syndrome, erythema multiforme, and toxic skin eruptions) with atazanavir sulfate use. Patients developing signs or symptoms of severe skin reactions or hypersensitivity reactions (including, but not limited to, severe rash or rash accompanied by one or more of the following: fever, general malaise, muscle or joint aches, blisters, oral lesions, conjunctivitis, facial edema, hepatitis, eosinophilia, granulocytopenia, lymphadenopathy, and renal dysfunction) must discontinue atazanavir sulfate and seek medical evaluation immediately.

17.5 Hyperbilirubinemia

Patients should be informed that asymptomatic elevations in indirect bilirubin have occurred in patients receiving atazanavir sulfate. This may be accompanied by yellowing of the skin or whites of the eyes and alternative antiretroviral therapy may be considered if the patient has cosmetic concerns.

17.6 Fat Redistribution

Patients should be informed that redistribution or accumulation of body fat may occur in patients receiving antiretroviral therapy including protease inhibitors and that the cause and long-term health effects of these conditions are not known at this time. It is unknown whether long-term use of atazanavir sulfate will result in a lower incidence of lipodystrophy than with other protease inhibitors.

17.7 FDA-Approved Patient Labeling

Patient Information

Atazanavir Sulfate Capsules

ALERT: Find out about medicines that should NOT be taken with atazanavir sulfate. Read the section "What important information should I know about taking atazanavir sulfate with other medicines?"

Read the Patient Information that comes with atazanavir sulfate before you start using it and each time you get a refill. There may be new information. This leaflet provides a summary about atazanavir sulfate and does not include everything there is to know about your medicine. This information does not take the place of talking with your healthcare provider about your medical condition or treatment.

What is atazanavir sulfate?

Atazanavir sulfate is a prescription medicine used with other anti-HIV medicines to treat people who are infected with the human immunodeficiency virus (HIV). HIV is the virus that causes acquired immune deficiency syndrome (AIDS). Atazanavir sulfate is a type of anti-HIV medicine called a protease inhibitor. HIV infection destroys CD4+ (T) cells, which are important to the immune system. The immune system helps fight infection. After a large number of (T) cells are destroyed, AIDS develops. Atazanavir sulfate helps to block HIV protease, an enzyme that is needed for the HIV virus to multiply. Atazanavir sulfate may lower the amount of HIV in your blood, help your body keep its supply of CD4+ (T) cells, and reduce the risk of death and illness associated with HIV.

Does atazanavir sulfate cure HIV or AIDS?

Atazanavir sulfate does not cure HIV infection or AIDS. At present there is no cure for HIV infection. People taking atazanavir sulfate may still get opportunistic infections or other conditions that happen with HIV infection. Opportunistic infections are infections that develop because the immune system is weak. Some of these conditions are pneumonia, herpes virus infections, and *Mycobacterium avium* complex (MAC) infections. **It is very important that you see your healthcare provider regularly while taking atazanavir sulfate.**

Atazanavir sulfate does not lower your chance of passing HIV to other people through sexual contact, sharing needles, or being exposed to your blood. For your health and the health of others, it is important to always practice safer sex by using a latex or polyurethane condom or other barrier to lower the chance of sexual contact with semen, vaginal secretions, or blood. Never use or share dirty needles.

Who should not take atazanavir sulfate?

Do not take atazanavir sulfate if you:

- **are taking certain medicines.** (See "What important information should I know about taking atazanavir sulfate with other medicines?") Serious life-threatening side effects or death may happen. Before you take atazanavir sulfate, tell your healthcare provider about all medicines you are taking or planning to take. These include other prescription and nonprescription medicines, vitamins, and herbal supplements.
- **are allergic to atazanavir sulfate or to any of its ingredients.** The active ingredient is atazanavir sulfate. See the end of this leaflet for a complete list of ingredients in atazanavir sulfate. Tell your healthcare provider if you think you have had an allergic reaction to any of these ingredients.

What should I tell my healthcare provider before I take atazanavir sulfate?

Tell your healthcare provider:

- **If you are pregnant or planning to become pregnant.** It is not known if atazanavir sulfate can harm your unborn baby. Pregnant women have experienced serious side effects when taking atazanavir sulfate with other HIV medicines called nucleoside analogues. You and your healthcare provider will need to decide if atazanavir sulfate is right for you. If you use atazanavir sulfate while you are pregnant, talk to your healthcare provider about the Antiretroviral Pregnancy Registry.
- **If you are breast-feeding.** You should not breast-feed if you are HIV-positive because of the chance of passing HIV to your baby. Also, it is not known if atazanavir sulfate can pass into your breast milk and if it can harm your baby. If you are a woman who has or will have a baby, talk with your healthcare provider about the best way to feed your baby.
- **If you have liver problems or are infected with the hepatitis B or C virus.** See "What are the possible side effects of atazanavir sulfate?"
- **If you have end stage kidney disease** managed with hemodialysis.
- **If you have diabetes.** See "What are the possible side effects of atazanavir sulfate?"
- **If you have hemophilia.** See "What are the possible side effects of atazanavir sulfate?"
- **About all the medicines you take** including prescription and nonprescription medicines, vitamins, and herbal supplements. Keep a list of your medicines with you to show your healthcare provider. For more information, see "What important information should I know about taking atazanavir sulfate with other medicines?" and "Who should not take atazanavir sulfate?"

Some medicines can cause serious side effects if taken with atazanavir sulfate.

How should I take atazanavir sulfate capsules?

- **Take atazanavir sulfate capsules once every day exactly as instructed by your healthcare provider.**

Your healthcare provider will prescribe the amount of atazanavir sulfate capsules that is right for you.

- For adults who have never taken anti-HIV medicines before, the dose is 300 mg once daily with 100 mg of NORVIR® (ritonavir) once daily taken with food. For adults who are unable to tolerate ritonavir, 400 mg (two 200-mg capsules) once daily (without NORVIR®) taken with food is recommended.
- For adults who have taken anti-HIV medicines in the past, the usual dose is 300 mg plus 100 mg of NORVIR® (ritonavir) once daily taken with food.
- Your dose will depend on your liver function and on the other anti-HIV medicines that you are taking. Atazanavir sulfate capsules are always used with other anti-HIV medicines. If you are taking atazanavir sulfate capsules with SUSTIVA® (efavirenz) or with VIREAD® (tenofovir disoproxil fumarate), you should also be taking NORVIR® (ritonavir).
- **Always take atazanavir sulfate capsules with food** (a meal or snack) to help it work better. Swallow the capsules whole. **Do not open the capsules.** Take atazanavir sulfate capsules at the same time each day.
- **If you are taking antacids or didanosine (VIDEX® or VIDEX® EC)**, take atazanavir sulfate capsules 2 hours before or 1 hour after these medicines.
- **If you are taking medicines for indigestion, heartburn, or ulcers such as AXID® (nizatidine), PEPCID AC® (famotidine), TAGAMET® (cimetidine), ZANTAC® (ranitidine), AcipHex® (rabeprazole), NEXIUM® (esomeprazole), PREVACID® (lansoprazole), PRILOSEC® (omeprazole), or PROTONIX® (pantoprazole),** talk to your healthcare provider.
- **Do not change your dose or stop taking atazanavir sulfate capsules without first talking with your healthcare provider.** It is important to stay under a healthcare provider's care while taking atazanavir sulfate capsules.
- **When your supply of atazanavir sulfate capsules starts to run low,** get more from your healthcare provider or pharmacy. It is important not to run out of atazanavir sulfate capsules. The amount of HIV in your blood may increase if the medicine is stopped for even a short time.
- **If you miss a dose of atazanavir sulfate capsules,** take it as soon as possible and then take your next scheduled dose at its regular time. If, however, it is within 6 hours of your next dose, do not take the missed dose. Wait and take the next dose at the regular time. Do not double the next dose. **It is important that you do not miss any doses of atazanavir sulfate capsules or your other anti-HIV medicines.**
- **If you take more than the prescribed dose of atazanavir sulfate capsules,** call your healthcare provider or poison control center right away.

Can children take atazanavir sulfate capsule?

Dosing recommendations are available for children 6 years of age and older for atazanavir sulfate capsules. Dosing recommendations are not available for children from 3 months to less than 6 years of age. Atazanavir sulfate should not be used in babies under the age of 3 months.

What are the possible side effects of atazanavir sulfate?

The following list of side effects is **not** complete. Report any new or continuing symptoms to your healthcare provider. If you have questions about side effects, ask your healthcare provider. Your healthcare provider may be able to help you manage these side effects.

The following side effects have been reported with atazanavir sulfate:

- **mild rash** (redness and itching) without other symptoms sometimes occurs in patients taking atazanavir sulfate, most often in the first few weeks after the medicine is started. Rashes usually go away within 2 weeks with no change in treatment. Tell your healthcare provider if rash occurs.
- **severe rash:** In a small number of patients, a rash can develop that is associated with other symptoms which could be serious and potentially cause death.

If you develop a rash with any of the following symptoms stop using atazanavir sulfate and call your healthcare provider right away:

- shortness of breath
- general ill feeling or "flu-like" symptoms
- fever
- muscle or joint aches
- conjunctivitis (red or inflamed eyes, like "pink eye")
- blisters
- mouth sores
- swelling of your face

- **yellowing of the skin or eyes.** These effects may be due to increases in bilirubin levels in the blood (bilirubin is made by the liver). Call your healthcare provider if your skin or the white part of your eyes turn yellow. Although these effects may not be damaging to your liver, skin, or eyes, it is important to tell your healthcare provider promptly if they occur.
- **a change in the way your heart beats (heart rhythm change).** Call your healthcare provider right away if you get dizzy or lightheaded. These could be symptoms of a heart problem.
- **diabetes and high blood sugar (hyperglycemia)** sometimes happen in patients taking protease inhibitor medicines like atazanavir sulfate. Some patients had diabetes before taking protease inhibitors while others did not. Some patients may need changes in their diabetes medicine.
- **if you have liver disease** including hepatitis B or C, your liver disease may get worse when you take anti-HIV medicines like atazanavir sulfate.
- **kidney stones** have been reported in patients taking atazanavir sulfate. If you develop signs or symptoms of kidney stones (pain in your side, blood in your urine, pain when you urinate) tell your healthcare provider promptly.
- **some patients with hemophilia** have increased bleeding problems with protease inhibitors like atazanavir sulfate.
- **changes in body fat.** These changes may include an increased amount of fat in the upper back and neck ("buffalo hump"), breast, and around the trunk. Loss of fat from the legs, arms, and face may also happen. The cause and long-term health effects of these conditions are not known at this time.

Other common side effects of atazanavir sulfate taken with other anti-HIV medicines include nausea; headache; stomach pain; vomiting; diarrhea; depression; fever; dizziness; trouble sleeping; numbness, tingling, or burning of hands or feet; and muscle pain.

Gallbladder disorders (which may include gallstones and gallbladder inflammation) have been reported in patients taking atazanavir sulfate.

What important information should I know about taking atazanavir sulfate with other medicines?

Do not take atazanavir sulfate if you take the following medicines (not all brands may be listed; tell your healthcare provider about all the medicines you take). Atazanavir sulfate may cause serious, life-threatening side effects or death when used with these medicines.

- Ergot medicines: dihydroergotamine, ergonovine, ergotamine, and methylergonovine such as CAFERGOT®, MIGRANAL®, D.H.E. 45®, ergotrate maleate, METHERGINE®, and others (used for migraine headaches).
- ORAP® (pimozide, used for Tourette's disorder).
- PROPULSID® (cisapride, used for certain stomach problems).
- Triazolam, also known as HALCION® (used for insomnia).
- Midazolam, also known as VERSED® (used for sedation), when taken by mouth.

Do not take the following medicines with atazanavir sulfate because of possible serious side effects:

- CAMPTOSAR® (irinotecan, used for cancer).
- CRIXIVAN® (indinavir, used for HIV infection). Both atazanavir sulfate and CRIXIVAN sometimes cause increased levels of bilirubin in the blood.
- Cholesterol-lowering medicines MEVACOR® (lovastatin) or ZOCOR® (simvastatin).
- UROXATAL® (alfuzosin, used to treat benign enlargement of the prostate).
- REVATIO® (Sildenafil, used to treat pulmonary arterial hypertension).

Do not take the following medicines with atazanavir sulfate because they may lower the amount of atazanavir sulfate in your blood. This may lead to an increased HIV viral load. Resistance to atazanavir sulfate or cross-resistance to other HIV medicines may develop:

- Rifampin (also known as RIMACTANE®, RIFADIN®, RIFATER®, or RIFAMATE®, used for tuberculosis).
- St. John's wort (*Hypericum perforatum*), an herbal product sold as a dietary supplement, or products containing St. John's wort.
- VIRAMUNE® (nevirapine, used for HIV infection).

The following medicines are not recommended with atazanavir sulfate:

- SEREVENT DISKUS® (salmeterol) and ADVAIR® (salmeterol with fluticasone), used to treat asthma, emphysema/chronic obstructive pulmonary disease also known as COPD.

Do not take the following medicine if you are taking atazanavir sulfate and NORVIR® together:

- VFEND® (voriconazole).

The following medicines may require your healthcare provider to monitor your therapy more closely (for some medicines a change in the dose or dose schedule may be needed):

- CIALIS® (tadalafil), LEVITRA® (vardenafil), or VIAGRA® (sildenafil), used to treat erectile dysfinction. Atazanavir sulfate may increase the chances of serious side effects that can happen with CIALIS, LEVITRA, or VIAGRA. Do not use CIALIS, LEVITRA, or VIAGRA while you are taking atazanavir sulfate unless your healthcare provider tells you it is okay.
- ADCIRCA® (tadalafil) or TRACLEER® (bosentan), used to treat pulmonary arterial hypertension
- LIPITOR® (atorvastatin) or CRESTOR® (rosuvastatin). There is an increased chance of serious side effects if you take atazanavir sulfate with this cholesterol-lowering medicine.
- Medicines for abnormal heart rhythm: CORDARONE® (amiodarone), lidocaine, quinidine (also known as CARDIOQUIN®, QUINIDEX®, and others).
- MYCOBUTIN® (rifabutin, an antibiotic used to treat tuberculosis).
- BUPRENEX®, SUBUTEX®, SUBOXONE®, (buprenorphine or buprenorphine/naloxone, used to treat pain and addiction to narcotic painkillers).
- VASCOR® (bepridil, used for chest pain).
- COUMADIN® (warfarin).
- Tricyclic antidepressants such as ELAVIL® (amitriptyline), NORPRAMIN® (desipramine), SINEQUAN® (doxepin), SURMONTIL® (trimipramine), TOFRANIL® (imipramine), or VIVACTIL® (protriptyline).
- Medicines to prevent organ transplant rejection: SANDIMMUNE® or NEORAL® (cyclosporin), RAPAMUNE® (sirolimus), or PROGRAF® (tacrolimus).
- The antidepressant trazodone (DESYREL® and others).
- Fluticasone propionate (FLONASE®, FLOVENT®), given by nose or inhaled to treat allergic symptoms or asthma. Your doctor may choose not to keep you on fluticasone, especially if you are also taking NORVIR®.
- Colchicine (COLCRYS®, used to prevent or treat gout or treat familial Mediterranean fever.

The following medicines may require a change in the dose or dose schedule of either atazanavir sulfate or the other medicine:

- INVIRASE® (saquinavir).
- NORVIR® (ritonavir).
- SUSTIVA® (efavirenz).
- Antacids or buffered medicines.
- VIDEX® (didanosine).
- VIREAD® (tenofovir disoproxil fumarate).
- MYCOBUTIN® (rifabutin).
- Calcium channel blockers such as CARDIZEM® or TIAZAC® (diltiazem), COVERA-HS® or ISOPTIN SR® (verapamil) and others.
- BIAXIN® (clarithromycin).
- Medicines for indigestion, heartburn, or ulcers such as AXID® (nizatidine), PEPCID AC® (famotidine), TAGAMET® (cimetidine), or ZANTAC® (ranitidine).

Talk to your healthcare provider about choosing an effective method of contraception. Atazanavir sulfate may affect the safety and effectiveness of hormonal contraceptives such as birth control pills or the contraceptive patch. Hormonal contraceptives do not prevent the spread of HIV to others.

Remember:

1. **Know all the medicines you take.**
2. **Tell your healthcare provider about all the medicines you take.**
3. **Do not start a new medicine without talking to your healthcare provider.**

How should I store atazanavir sulfate capsules?

- Store atazanavir sulfate capsules at room temperature, 59° to 86°F (15° to 30°C). Do **not** store this medicine in a damp place such as a bathroom medicine cabinet or near the kitchen sink.
- Keep your medicine in a tightly closed container.
- Keep all medicines out of the reach of children and pets at all times. Do not keep medicine that is out of date or that you no longer need. Dispose of unused medicines through community take-back disposal programs when available or place atazanavir sulfate capsules in an unrecognizable, closed container in the household trash.

General information about atazanavir sulfate capsules

This medicine was prescribed for your particular condition. Do not use atazanavir sulfate capsules for another condition. Do not give atazanavir sulfate to other people, even if they have the same symptoms you have. It may harm them. **Keep atazanavir sulfate capsules and all medicines out of the reach of children and pets.**

This summary does not include everything there is to know about atazanavir sulfate capsules. Medicines are sometimes prescribed for conditions that are not mentioned in patient information leaflets. Remember no written summary can replace careful discussion with your healthcare provider. If you would like more information, talk with your healthcare provider or you can call 1-877-4-INFO-RX (1-877-446-3679).

What are the ingredients in atazanavir sulfate capsule?

Active Ingredient: atazanavir sulfate

Inactive Ingredients: Crospovidone, lactose monohydrate, magnesium stearate, gelatin, FD&C Blue #2, and titanium dioxide.

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