

DRUG INTERACTIONS WITH CCR5 ANTAGONISTS

	Maraviroc, MVC, Celsentri® (Pfizer)	Aplaviroc (GSK) (***no longer in clinical studies)	Vicriviroc (Merck) (***no longer in clinical studies)
Doses under study	150-600 mg BID, depending on concomitant medications	400-600 mg BID	5-15 mg QD, 10-50 mg BID
Metabolism	3A4, Pgp	3A4, 2C19 (minor), weak 3A inhibitor ¹ Substrate of P-glycoprotein.	CYP3A4
Food Effect	↓ 33% AUC with high fat meal	↑ 47-63% AUC ²	↓ rate of absorption and ↓ Cmax 58%, AUC not significantly affected by high-fat meal. Administer with or without food. ³
Interactions with Antiretrovirals:			
atazanavir	When maraviroc 300 mg BID was given with atazanavir 400 mg QD, maraviroc AUC ↑ 3.6-fold, Cmax ↑ 2.1-fold, Cmin ↑ 4.2-fold. Reduction of maraviroc dose by 50% in the presence of protease inhibitors/potent CYP3A4 inhibitors is recommended. ⁴		
Atazanavir/ritonavir	When maraviroc 300 mg BID was given with atazanavir 300/ritonavir 100 mg QD, maraviroc AUC ↑ 4.9-fold, Cmax ↑ 2.7-fold, Cmin ↑ 6.7-fold. Reduction of maraviroc dose by 50% in the presence of protease inhibitors/potent CYP3A4 inhibitors is recommended. ⁴ In 15 HIV-positive patients who received maraviroc 150 mg plus atazanavir 300/100 mg daily as part of a PK substudy of a randomized 48 week trial comparing MVC/ATVr vs ATVr + TDF/FTC, adequate maraviroc exposures were achieved at week 2: AUC 4330 ng.h/mL, Cavg 180 ng/mL, Cmax 650 ng/mL, Cmin 37 ng/mL. All subjects achieved the targeted Cavg >75 ng/mL for near maximal virologic efficacy based upon	Combination of aplaviroc 400 mg BID or 800 mg QD plus atazanavir 300 mg/ritonavir 100 mg QD in healthy volunteers resulted in significant increases in aplaviroc exposures (7-13 fold ↑ AUC, 2-5 fold ↑ C _T ,) with a greater effect when aplaviroc was dosed QD. Atazanavir kinetics were not significantly changed in the presence of aplaviroc. ⁸	The combination of vicriviroc 15 mg/ritonavir 100 mg QD plus atazanavir 300 mg QD in healthy volunteers did not lead to significant changes in vicriviroc plasma levels, compared to vicriviroc 15 mg QD /ritonavir 100 mg BID alone. Vicriviroc may be added to a ritonavir-boosted PI regimen without dosage adjustment. ⁹

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	<p>exposure-response analysis from the MERIT study.⁵ Week 24 interim analysis results of the randomized trial showed similar outcomes in both arms.⁶</p> <p>Modeling of maraviroc kinetics showed that maraviroc 150 mg QD plus ATV 300/100 mg QD in HIV-positive subjects yielded lower C_{max} and C_{avg} but higher C_{min} and effective constant concentrations compared to maraviroc 300 mg BID alone in healthy volunteers.⁷</p>		
AZT/3TC	In healthy volunteers, Combivir 1 tab BID + maraviroc 300 mg BID/placebo for 7 days showed no clinically relevant effect on the kinetics of AZT/3TC. ¹⁰		In healthy volunteers, Combivir 1 tab BID + vicriviroc 50 mg BID for 7 days showed no clinically relevant effect on the kinetics of AZT/3TC or of vicriviroc. ¹¹
Darunavir/ritonavir	<p>In healthy subjects, maraviroc 150 mg BID plus darunavir 600/ritonavir 100 mg BID resulted in 2.3-fold ↑ C_{max}, 4-fold ↑ AUC of maraviroc vs. maraviroc administered alone. Reduce maraviroc dose to 150 mg BID when coadministering with darunavir/ ritonavir.¹²</p> <p>In a retrospective review, peak and trough levels were compared in HIV-positive patients taking either maraviroc 300 mg BID plus tenofovir/FTC, maraviroc 300 mg QD plus darunavir 800/100 mg QD or maraviroc 150 mg QD plus darunavir 800/100 mg QD. Maraviroc concentrations were comparable between the groups and all C_{trough} >25 ng/mL. C_{peak} did not exceed 1000 ng/mL and no cases of postural hypotension</p>		Open label, multidose study in healthy adult subjects (n=12) to investigate the PK effects of vicriviroc 30mg daily + RTV 100mg BID +/- DRV 600mg BID. Addition of darunavir led to 7%↓ AUC, 17% ↓ C _{max} , 3% ↑ C _{min} of vicriviroc. Darunavir did not alter VCV levels to clinically important extent. No dose adjustment required. ¹⁴

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	<p>were noted. In the BID group, median C_{peak} was 384 and C_{trough} was 48 ng/mL, in the MVC 300 mg QD group, median C_{peak} was 773 and C_{trough} was 70 ng/mL, and in the MVC 150 mg QD group, median C_{trough} was 50 ng/mL. All darunavir concentrations were therapeutic.¹³</p> <p>See additional entry for darunavir/ritonavir + etravirine plus maraviroc.</p>		
Efavirenz	<p>When maraviroc 100 mg BID was given with efavirenz 600 mg QD, maraviroc AUC ↓ 50%, C_{max} ↓ 60%, C_{min} ↓ 45%. Doubling maraviroc dose to 200 mg BID corrected maraviroc exposures.</p> <p>When administering maraviroc with efavirenz (in the absence of protease inhibitors), doubling maraviroc dose is recommended.⁴</p>	<p>In healthy adults, coadministration of aplaviroc 600 mg BID and efavirenz 600 mg QD for 10 days led to 57% ↓ AUC and 61% ↓ C_t of aplaviroc. Efavirenz exposures were not significantly different compared to historical controls.¹⁵ Co-administration with a boosted PI regimen (e.g., FPV/rtv 700/100 mg BID) may be effective in counteracting the inductive effects of EFV.¹⁶</p>	<p>In healthy adults, coadministration of efavirenz 600 mg QD and vicriviroc 10 mg QD for 14 days resulted in 81% ↓ AUC, 67% ↓ C_{max} of vicriviroc vs. vicriviroc alone.</p> <p>When vicriviroc was given with efavirenz plus ritonavir 100 mg QD, vicriviroc AUC ↑ 384%, C_{max} ↑ 196% vs. vicriviroc alone.¹⁷</p>
Elvitegravir/ ritonavir	<p>In a randomized, healthy subject study (n=28), volunteers received EVG/r 150/100mg QD for 10 days followed by EVG 150/100mg QD plus maraviroc 150mg BID for 10 days or vice versa. No clinically relevant changes in EVG/rtv kinetics were observed with the combination, while maraviroc exposures were ↑ in the presence of EVG/rtv (maraviroc AUC ↑ 2.15 fold, C_{max} ↑ 2.86 fold). Therefore, reduce maraviroc dose to 150mg BID when used with EVG/r (same as dose recommendation for</p>		

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	MVC + other CYP 3A4 inhibitors). ¹⁸		
Etravirine *See additional entry for darunavir/ritonavir + etravirine plus maraviroc.	<p>Total maraviroc concentrations over a 12-hour period are reduced by 53% (AUC₁₂) and peak levels of maraviroc (C_{max}) by 60% in the presence of etravirine.</p> <p>Therefore, if a patient isn't also taking a potent CYP3A4 inhibitor such as RTV-boosted protease inhibitor, maraviroc dose should be increased to 600mg twice daily. No dose adjustment of etravirine is required.</p> <p>In 64 HIV-positive patients taking maraviroc 300 or 600 mg BID plus etravirine 200 mg BID without PIs, 67% C_{trough} were <75 ng/mL (75% with maraviroc 300 mg BID and 63% with maraviroc 600 mg BID). Mean maraviroc C_{trough} was 53 and 60 ng/mL in the 300 and 600 mg BID groups, respectively. Etravirine C_{trough} was 723 ng/mL, approximately 180-fold higher than the protein-adjusted EC₅₀ for wild type virus¹⁹</p> <p>In a cohort of patients receiving maraviroc and raltegravir with or without etravirine, significantly lower maraviroc C_{trough} were observed when combined with etravirine vs. without etravirine (57 vs 173.5 ng/mL respectively, p=0.01). Patients treated with maraviroc had significantly greater CD4 increases versus those not on maraviroc.²⁰</p>		
Fosamprenavir	In healthy volunteers, combination of maraviroc 300 mg BID plus fosamprenavir 1400 mg BID led to reduced concentrations of both		

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	drugs: ²¹ <ul style="list-style-type: none"> • MVC AUC ↓13%, Cmax ↓ 11%, Cmin ↓28% • APV AUC ↓ 44%, Cmax ↓ 51%, Cmin ↓ 1% Data suggest that standard dose maraviroc may be used with fosamprenavir.		
Fosamprenavir/ritonavir	In healthy volunteers, combination of maraviroc 300 mg BID plus fosamprenavir 1400/ritonavir 100 mg QD led to reduced concentrations of both drugs: ²¹ <ul style="list-style-type: none"> • MVC AUC ↓2%, Cmax ↓ 7%, Cmin ↓23% • APV AUC ↓ 21%, Cmax ↓ 32%, Cmin ↓ 36% In same study, combination of maraviroc 300 mg BID plus fosamprenavir 700/ritonavir 100 mg BID led to: <ul style="list-style-type: none"> • MVC AUC ↓66%, Cmax ↓ 70%, Cmin ↓54% • APV AUC ↓ 26%, Cmax ↓ 31%, Cmin ↓ 24% Data suggest that standard dose maraviroc may be used with fosamprenavir; need for MVC dose ↑ with FPV/r BID is unknown). ²¹		The combination of vicriviroc 15 mg QD plus fosamprenavir 700 mg/ritonavir 100 mg BID in healthy volunteers did not lead to significant changes in vicriviroc plasma levels, compared to vicriviroc 15 mg QD/ritonavir 100 mg BID alone. Vicriviroc may be added to a ritonavir-boosted PI regimen without dosage adjustment. ⁹
Indinavir/ritonavir			The combination of vicriviroc 15 mg QD plus indinavir 800 mg/ritonavir 100 mg BID in healthy volunteers did not lead to significant changes in vicriviroc plasma levels, compared to vicriviroc 15 mg QD/ritonavir 100 mg BID alone. Vicriviroc may be added to a ritonavir-boosted PI regimen without dosage adjustment. ⁹
Lamivudine	Maraviroc had no effect on the pharmacokinetics of lamivudine. ²²		
Lopinavir/ritonavir	When maraviroc 100 mg BID was given with		Vicriviroc exposure ↑ similarly by ritonavir or

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	<p>lopinavir/ritonavir 400/100 mg BID, maraviroc AUC ↑ 3.8-fold, C_{max} ↑ 1.8-fold, C_{min} ↑ 9.2-fold. Reduction of maraviroc dose to 50 mg BID resulted in maraviroc AUC ↑ 1.6-fold.</p> <p>Maraviroc 50% dose reduction in the presence of protease inhibitors/potent CYP3A4 inhibitors is recommended.⁴</p> <p>When maraviroc was given as 150 mg QD with lopinavir/ritonavir 400/100 mg BID in HIV-infected subjects (n=10), median (IQR) maraviroc concentrations were as follows: AUC_{24h} 4694 (3923-5516) hr*ng/ml, C_{avg} 179 (159 -221) ng/ml, C_{max} 601 (491-689) ng/ml, C_{min} 59 (39-64) ng/ml. All 10 subjects achieved the targeted C_{avg} (> 75 ng/ml).²³</p>		<p>lopinavir/ritonavir:</p> <p>In healthy subjects, vicriviroc 10 mg QD was given alone or with ritonavir 100 mg QD or lopinavir/ritonavir 400 mg QD for 14 days. In the presence of ritonavir, vicriviroc AUC ↑ 5.4-fold and C_{max} ↑ 2.5-fold, while in the presence of lopinavir/rtv, vicriviroc AUC ↑ 4.2-fold and C_{max} ↑ 2.3-fold. Both combinations were well tolerated.²⁴</p>
nelfinavir			<p>The combination of vicriviroc 15 mg QD /ritonavir 100 mg BID plus nelfinavir 1250 mg BID in healthy volunteers did not lead to significant changes in vicriviroc plasma levels, compared to vicriviroc 15 mg QD /ritonavir 100 mg BID alone. Vicriviroc may be added to a ritonavir-boosted PI regimen without dosage adjustment.⁹</p>
Nevirapine	<p>In a cohort of HIV+ subjects (n=8) stabilized on nevirapine, 3TC and tenofovir, kinetics of single dose maraviroc 300 mg were unchanged vs. control data in HIV+ subjects receiving maraviroc alone for 10</p>		

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	days. ²⁵		
Raltegravir	<p>In an open-label, fixed sequence study, healthy subjects (n=18) received raltegravir 400 mg BID for 3 days, then maraviroc 300 mg BID for 6 days, then both drugs together for 3 days. Plasma drug concentrations were measured on the last day of each phase. When maraviroc and raltegravir were co-administered, mean maraviroc AUC ↓ 14% and Cmax ↓ 20% and mean raltegravir AUC ↓ 37% and Cmax ↓ 33% respective relative to each drug administered alone. The mechanism may be via decreased absorption or increase in first-pass metabolism.</p> <p>The authors considered these changes not to be clinically significant, and dose adjustments are not suggested. Monitoring for safety and efficacy is recommended with this combination.²⁶</p>		
Ritonavir	<p>When maraviroc 100 mg BID was given with ritonavir 100 mg BID, maraviroc AUC ↑ 2.6-fold, Cmax ↑ 1.3-fold. Reduction of maraviroc dose to 50 mg BID gave similar exposures as maraviroc 100 mg BID alone. Maraviroc 50% dose reduction in the presence of protease inhibitors/potent CYP3A4 inhibitors is recommended.⁴</p>		<p>In healthy volunteers, ritonavir 100 mg QD or 100-400 mg BID plus vicriviroc 10 mg BID significantly ↑ SCH AUC 500% (469-585%) and Cmax 350% (301-395%), regardless of ritonavir dose.²⁷</p>
saquinavir	<p>When maraviroc 100 mg BID was given with saquinavir-sgc 1200 mg TID, maraviroc AUC ↑ 4.3-fold, Cmax ↑ 3.3-fold. Reduction of maraviroc dose by 50% in the presence of protease inhibitors/potent CYP3A4 inhibitors is</p>		

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	recommended. ⁴		
Saquinavir/ritonavir	When maraviroc 100 mg BID was given with saquinavir-sgc/ritonavir 1000/100 mg BID, maraviroc AUC ↑ 9.8-fold, C _{max} ↑ 4.8-fold. Reduction of maraviroc dose to 25 mg BID resulted in maraviroc AUC ↑ 1.4-fold. Maraviroc 50% dose reduction in the presence of protease inhibitors/potent CYP3A4 inhibitors is recommended. ²²		The combination of vicriviroc 15 mg QD plus saquinavir-sgc 1000 mg/ritonavir 100 mg BID in healthy volunteers did not lead to significant changes in vicriviroc plasma levels, compared to vicriviroc 15 mg QD/ritonavir 100 mg BID alone. Vicriviroc may be added to a ritonavir-boosted PI regimen without dosage adjustment. ⁹
tenofovir	Maraviroc 300 mg BID did not affect kinetics of tenofovir 300 mg QD. ⁴	Healthy volunteer, randomized study of tenofovir 300 mg daily and aplaviroc 600 mg BID showed no significant effect of tenofovir on aplaviroc AUC or C _{max} , and a moderate increase in C _T of 80%. Tenofovir pharmacokinetics were not changed in the presence of aplaviroc. ²⁸	In healthy volunteers, tenofovir 300 mg QD plus vicriviroc 10 mg BID for 7 days showed no clinically relevant effect on the kinetics of either drug. Tenofovir was given with the morning vicriviroc dose with food. ²⁹
Tipranavir/ ritonavir	Combination of maraviroc 150 mg BID plus tipranavir 500/200 mg BID in healthy subjects did not lead to any significant changes in maraviroc exposures. ³⁰ Regular dosing of maraviroc (i.e., 300 mg BID) may be used with tipranavir/ritonavir.		Vicriviroc 15 mg QD was administered with ritonavir 200 mg BID or with tipranavir 500 mg/ ritonavir 200 mg BID in healthy subjects. When compared to VCV values with RTV alone, the addition of tipranavir did not significantly alter VCV exposure. Vicriviroc dose adjustment is not required when co-administering with tipranavir/ ritonavir. ³¹
Zidovudine	Maraviroc had no effect on the pharmacokinetics of zidovudine. ²²		
Multi-ARV drug interactions:			

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Darunavir/ritonavir + etravirine	<p>Co-administration of etravirine/darunavir/ritonavir with maraviroc increased the exposure of maraviroc by 210% (AUC₁₂) and peak levels (C_{max}) by 77% compared to maraviroc alone.</p> <p>Thus, if maraviroc is being dosed alongside etravirine and darunavir together, a maraviroc dose reduction to 150mg twice daily is necessary. No dose adjustment of ETV is necessary.³²</p>		
Efavirenz plus fosamprenavir/ritonavir		<p>Co-administration of aplaviroc 400 mg BID, fosamprenavir 700 mg/ritonavir 100 mg BID and efavirenz 600 mg QD led to a 2.6-fold ↑ AUC and 2.5-fold ↑ Ctau of aplaviroc compared to aplaviroc alone.¹⁶</p> <p>Therefore, co-administration with a boosted PI regimen appears to be effective in counter-acting the inductive effects of EFV.</p>	
Efavirenz plus lopinavir/ritonavir	<p>When maraviroc 300 mg BID was given with lopinavir/ritonavir 400/100 mg BID plus efavirenz 600 mg QD, maraviroc AUC ↑ 2.5-fold, Cmax ↑ 1.3-fold, Cmin ↑ 6.3-fold vs. maraviroc alone.²²</p> <p>Maraviroc 150 mg BID dose recommended.²²</p>		
Efavirenz plus saquinavir/ritonavir	<p>When maraviroc 100 mg BID was given with saquinavir-sgc/ritonavir 1000/100 mg BID plus efavirenz 600 mg QD, maraviroc AUC ↑ 5-fold, Cmax ↑ 2.3-fold, Cmin ↑ 8.4-</p>		

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	fold vs. maraviroc alone. ²² Maraviroc 150 mg BID dose recommended. ²²		
Interactions with other medications:			
Carbamazepine			In healthy volunteers who received carbamazepine plus vicriviroc 30 mg with or without ritonavir, carbamazepine did not alter VCV exposure when dosed with 100 mg BID RTV. If CBZ is coadministered with VCV in a RTV-boosted PI-containing regimen, no VCV dose adjustment is required, but the RTV dose should be increased, to 100 mg BID or 200 mg QD. ³³
Digoxin	In healthy subjects who received maraviroc 300 mg BID for 6 days, the pharmacokinetics of single dose digoxin 0.25 mg were not altered in the presence of maraviroc compared to digoxin administered alone. This suggests that maraviroc is not a P-gp inhibitor and that dose adjustments are not required. ³⁴		
Hmg Co-A Reductase Inhibitors (statins)	CCR5 receptors, are located on cholesterol-rich 'lipid rafts' within cell membranes. Statins may reduce lipid raft numbers, potentially altering CCR5 availability and efficacy. A post-hoc analysis of the MOTIVATE studies assessed viral load and CD4 counts in 84 patients (of 840 total number of subjects) on statins (i.e., on statins at baseline and throughout study or at least 300 days). There was no difference in mean VL reduction, % achieving <50 copies/mL and		

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	CD4 increases at 48 weeks between study subjects on vs. not on statins. ³⁵		
Ketoconazole	When given with ketoconazole 400 mg QD, maraviroc AUC ↑ 5-fold, Cmax ↑ 3.4-fold. Reduction of maraviroc dose by 50% in the presence of protease inhibitors/potent CYP3A4 inhibitors is recommended. ⁴		In healthy volunteers who received ketoconazole plus vicriviroc 30 mg with or without ritonavir, exposure of VCV was substantially increased (503% based on AUC) when administered concomitantly just with keto, while keto only modestly increased VCV concentrations (136% based on AUC) in the presence of RTV, compared to VCV alone. ³³
Midazolam	Maraviroc 300 mg BID had no effect on single-dose exposure of midazolam 7.5 mg. ⁴		In healthy volunteers who received midazolam plus vicriviroc 30 mg with or without ritonavir, midazolam exposure was not affected by VCV administered alone, but was markedly increased when VCV was administered with RTV, a potent CYP3A4 inhibitor. ³³
Oral contraceptives	Maraviroc 100 mg BID had no effect on exposure of ethinylestradiol 30ug/levonorgestrel 150ug QD. ⁴		
Phosphodiesterase-5 Inhibitors	No pharmacokinetic interaction is expected, as maraviroc does not inhibit CYP3A4. However, the PDE-5 inhibitors can decrease blood pressure and maraviroc doses >600 mg can increase the risk of postural hypotension. Maraviroc 300 mg BID should be administered with caution. ³⁶ In 18 healthy subjects who received maraviroc 300 mg		

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	BID for 3 days plus single-dose vardenafil 20 mg, no clinically significant additive declines in systolic or diastolic blood pressures (both standing and supine) were noted. ³⁷		
Rifabutin			In healthy volunteers who received rifabutin plus vicriviroc 30 mg with or without ritonavir, rifabutin did not alter VCV exposure when dosed with 200 mg QD RTV. If rifabutin is coadministered with VCV in a RTV-boosted PI-containing regimen, no VCV dose adjustment is required, but the RTV dose should be increased, to 100 mg BID or 200 mg QD. ³³
Rifampin	When maraviroc 100 mg BID was given with rifampin 600 mg QD, maraviroc AUC and C _{max} ↓ 70%, C _{min} ↓ 78%. Doubling maraviroc dose to 200 mg BID corrected maraviroc exposures. ⁴ When administering maraviroc with rifampin, doubling maraviroc dose (to 600 mg BID) is recommended.		In healthy volunteers who received rifampin plus vicriviroc 30 mg with or without ritonavir, rifampin markedly decreased VCV exposure when dosed with 100 mg BID RTV; the relative oral bioavailability of VCV + RTV with rifampin compared to VCV + RTV alone was 11.6% based on AUC. Coadministration of rifampin with VCV is not recommended. ³³
Trimethoprim	Maraviroc 300 mg BID did not affect kinetics of trimethoprim 960 mg BID. ⁴		

References:

1. Johnson B, Song I, Adkinson K, et al. 873140, a novel CCR5 receptor antagonist, does not significantly interact with major drug metabolizing enzymes [abstract 75]. 6th International Workshop on Clinical Pharmacology of HIV Therapy April 28-30, 2005, Quebec.

2. Adkinson K, Song I, Fang L, et al. The effect of food and formulation on the pharmacokinetics of the novel CCR5 antagonist, 873140 [abstract 81]. 6th International Workshop on Clinical Pharmacology of HIV Therapy April 28-30, 2005, Quebec.
3. Keung A, Sansone A, Caceres M, et al. Effect of Food on Bioavailability of SCH 417690 in Healthy Volunteers [abstract A-1200]. 45th Interscience Conference on Antimicrobial Agents and Chemotherapy December 16-19, 2005, Washington, DC.
4. Abel S, Russell D, Ridgway C, et al. Overview of the drug-drug interaction data for maraviroc (UK-427,857) [abstract 76]. 6th International Workshop on Clinical Pharmacology of HIV Therapy April 28-30, 2005, Quebec.
5. Vourvahis M, Vallun SR, Damle B, et al. Pharmacokinetics of QD maraviroc administered as part of a novel NRTI-sparing regimen with atazanavir/ritonavir in HIV treatment-naive patients [abstract 37]. 11th International Workshop on Clinical Pharmacology of HIV Therapy, April 5-7, 2010, Sorrento, Italy.
6. Mills A, Mildvan D, Podzamczar D, et al. Safety and immunological activity of once daily maraviroc in combination with ritonavir-boosted atazanavir compared to emtricitabine 200 mg/tenofovir 300 mg QD plus ATVr in treatment-naive patients infected with CCR5-tropic HIV-1 (Study A4001078): a week 24 planned interim analysis [abstract THLB203]. XVIII International AIDS Conference, July 18-23, 2010, Vienna, Austria.
7. Weatherley B, Vourvahis M, McFadyen L. Modeling of maraviroc pharmacokinetics in the presence of atazanavir/ritonavir in healthy volunteers and HIV-1-infected patients [abstract P_05]. 12th International Workshop on Clinical Pharmacology of HIV Therapy, April 13-15, 2011, Miami, USA.
8. Song I, Adkison K, Shachoy-Clark A, et al. Pharmacokinetic interaction between 873140 and atazanavir/ritonavir [abstract A-1196]. 45th Interscience Conference on Antimicrobial Agents and Chemotherapy December 16-19, 2005, Washington, DC
9. Sansone A, Keung A, Tetteh E, et al. Pharmacokinetics of vicriviroc are not affected in combination with five different protease inhibitors boosted by ritonavir [abstract 582]. 13th Conference on Retroviruses and Opportunistic Infections, February 5-8, 2006, Denver, CO.
10. Russell D, Abel S, Hackman F, et al. The effect of maraviroc (UK-427,857) on the pharmacokinetics of 3TC/AZT (Combivir) in healthy subjects [abstract 30]. 6th International Workshop on Clinical Pharmacology of HIV Therapy April 28-30, 2005, Quebec.
11. Sansone A, Guillaume M, Kraan M, et al. The pharmacokinetics of SCH 417690 when administered alone and in combination with lamivudine/zidovudine [abstract 84]. 6th International Workshop on Clinical Pharmacology of HIV Therapy April 28-30, 2005, Quebec.
12. Abel S, Ridgway C, Hamlin J, et al. An open, randomised, 2-way crossover study to investigate the effect of darunavir/ritonavir on the pharmacokinetics of maraviroc in healthy subjects [abstract 55]. 8th International Workshop on Pharmacology of HIV Therapy, April 16-18, 2007, Budapest, Hungary.
13. Taylor S, Dufty N, Watson J, et al. Maraviroc 300 mg once daily + darunavir/ritonavir 800/100 mg once daily provides maraviroc trough concentrations comparable to trough concentrations in HIV-1 patients taking maraviroc 300 mg twice daily + Truvada: implications for phase 3 studies [abstract 636]. 18th Conference on Retroviruses and Opportunistic Infections, Feb 27-Mar2, 2011, Boston, USA.

14. Kasserra C, Sansone-Parsons A, Keung A, et al. Vicriviroc pharmacokinetic parameters are unchanged when co-administered with darunavir in a ritonavir-containing regimen (abstract P35). 9th International Workshop on Clinical Pharmacology of HIV Therapy, April 7-9 2008, New Orleans, LA.
15. Adkison K, Fang L, Shachoy-Clark A, et al. The pharmacokinetic interaction between the entry inhibitor 873140 and efavirenz in healthy adults [abstract A-1197]. 45th Interscience Conference on Antimicrobial Agents and Chemotherapy December 16-19, 2005, Washington, DC
16. Adkison K, Fang L, Shachoy-Clark A, et al. Coadministration of fosamprenavir/ritonavir overcomes the effect of efavirenz induction on 873140 pharmacokinetics [abstract A-1194]. 45th Interscience Conference on Antimicrobial Agents and Chemotherapy December 16-19, 2005, Washington, DC.
17. Sansone A, Saltzman M, Rosenberg M, et al. Pharmacokinetics of SCH 417690 administered alone or with ritonavir and efavirenz in healthy volunteers [abstract 79]. 6th International Workshop on Clinical Pharmacology of HIV Therapy April 28-30 2005, Quebec.
18. Ramanathan S, Abel S, Tweedy S, et al. Pharmacokinetic interaction of ritonavir-boosted elvitegravir and maraviroc. JAIDS 2010;53(2):209-14.
19. Solas C, Garraffo R, Gagnieu MC, et al. Pharmacokinetic interaction between maraviroc and etravirine: a multicentre study in HIV-patients receiving an antiretroviral regimen without PI [abstract O_13]. 12th International Workshop on Clinical Pharmacology of HIV Therapy, April 13-15, 2011, Miami, USA.
20. Corcione S, Calcagno A, Bonora S, et al. Clinical pharmacology of complex regimen of antiretroviral therapy including etravirine, maraviroc and raltegravir [abstract P_29]. 12th International Conference on Clinical Pharmacology of HIV Therapy, April 13-15th, 2011, Miami, USA.
21. Lubber A, Condoluci D, Slowinski PD, et al. Steady-state pharmacokinetics of maraviroc and amprenavir alone and in combination after maraviroc is given BID with unboosted or ritonavir-boosted fosamprenavir once- or twice-daily in fasted healthy volunteers [abstract P_31]. 10th International Workshop on Clinical Pharmacology of HIV Therapy, April 15-17, 2009, Amsterdam, the Netherlands.
22. Pfizer Labs. SELZENTRY (maraviroc) Prescribing Information. New York, NY 2007.
23. Bonora S, Nozza S, González de Requena D, et al. Pharmacokinetics of maraviroc administered at 150 mg QD in association with lopinavir/ritonavir as a part of a novel NRTI-sparing regimen in naïve patients [abstract CDB293] 6th IAS Conference on HIV Pathogenesis, Treatment and Prevention, July 17-20, 2011, Rome, Italy.
24. Sansone A, Saltzman M, Rosenberg M, et al. Pharmacokinetics of SCH 417690 administered alone or in combination with ritonavir or lopinavir/ritonavir [abstract 83]. 6th International Workshop on Clinical Pharmacology of HIV Therapy April 28-30, 2005, Quebec.
25. Muirhead G, Russell D, Pozniak A, et al. A novel probe drug interaction study to investigate the effect of selected ARV combinations on the PK of a single oral dose of Maraviroc in HIV+ve subjects [abstract 31]. 6th International Workshop on Clinical Pharmacology of HIV Therapy April 28-30, 2005, Quebec.
26. Andrews E, Glue P, Fang J, et al. Assessment of the pharmacokinetics of co-administered maraviroc and raltegravir. Br J Clin Pharmacol 2010;69:51-7.

27. Sansone A, Seiberling M, Kraan M, et al. Similar increase in SCH 417690 exposure with coadministration of varying doses of ritonavir in healthy volunteers [abstract 78]. 6th International Workshop on Clinical Pharmacology of HIV Therapy, April 28-30, 2005, Quebec City.
28. Song I, Adkison K, Shachoy-Clark A, et al. Absence of pharmacokinetic drug interaction between 873140 and tenofovir disoproxil fumarate [abstract A-1195]. 45th Interscience Conference on Antimicrobial Agents and Chemotherapy, December 16-19, 2005, Washington, DC.
29. Sansone A, Guillaume M, Kraan M, et al. Pharmacokinetics of SCH 417690 administered alone or in combination with tenofovir [abstract 85]. 6th International Workshop on Clinical Pharmacology of HIV Therapy, April 28-30, 2005, Quebec City.
30. Abel S, et al. E. Effect of boosted tipranavir on the pharmacokinetics of maraviroc (UK 427,857) in healthy volunteers [abstract LBPE4.3/15]. 10th European AIDS Conference, November 17-20, 2005, Dublin.
31. Sansone-Parsons A, et al. E. The addition of tipranavir has no impact on the pharmacokinetics of vicriviroc when coadministered with a potent CYP3A4 inhibitor such as ritonavir [abstract 57]. 8th International Workshop on Clinical Pharmacology of HIV Therapy, April 16-18, 2007, Budapest, Hungary.
32. Kakuda TN, Abel S, Davis J, et al. Pharmacokinetic interactions of maraviroc with darunavir/ritonavir, maraviroc with etravirine, and maraviroc with etravirine/darunavir/ritonavir in healthy volunteers: results of two drug interaction trials. *Antimicrob Agents Chemother* 2011;[epub March 7].
33. Kasserra C, O'Mara EM, Lisbon E. Assessment of pharmacokinetic and safety interactions between vicriviroc and CYP3A4 substrates, inhibitors, and inducers [abstract H-230]. 49th Interscience Conference on Antimicrobial Agents and Chemotherapy, September 12-15, 2009, San Francisco.
34. Vourvahis M, Fang J, Choo HW, et al. Lack of a clinically relevant effect of maraviroc on the pharmacokinetics of digoxin in healthy volunteers [abstract P_14]. 12th International Workshop on Clinical Pharmacology of HIV Therapy, April 13-15th, 2011, Miami, USA.
35. Moyle G, Rajjic N, Valdez H, et al. Concurrent use of statins does not influence efficacy of maraviroc in MOTIVATE studies [abstract MOPEB039]. 5th IAS Conference on HIV Pathogenesis, Treatment and Prevention, July 19-22, 2009, Capetown, South Africa.
36. Pfizer Canada Inc. Celsentri (maraviroc) Product Monograph. Kirkland, QC 2009.
37. Vourvahis M, Fang J, Huyghe I. Hemodynamic effects of single-dose vardenafil in subjects receiving maraviroc [abstract WEPEB255]. 5th IAS Conference on HIV Pathogenesis, Treatment and Prevention, July 19-22, 2009, Capetown, South Africa.