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HIV Therapy - Drug Interactions

Christopher Holtzer, Pharm.D., Rebecca Coleman, Pharm.D.

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In addition to drugs for human immunodeficiency virus (HIV), patients with HIV infection often require multiple drugs for prophylaxis and treatment of infectious complications, malignancies and a variety of concurrent medical problems. One of the challenges of managing a patient on multiple therapies is anticipating and appropriately responding to drug-drug interactions. The task of staying current in this field is made more difficult because of the rapid approval of new agents and complex regimens which HIV infected patients may utilize. The information in this chart should be used as a guide. While it includes much of what has been published in this area, this field is evolving rapidly and current literature should always be reviewed. Major drugs are listed within therapeutic categories.

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Antiretrovirals || Antifungals || Antivirals || Anti-Pneumocystis || Anti-Mycobacterial || Anti-Toxoplasma || Anti-Wasting

Antiretrovirals

Interacting Drugs		Effect	Mechanism
Abacavir (Ziagen, 1592U89)	Disulfuram Chlorzoxazone Chlorpromazine Isoniazid Chloral hydrate	Possible increase in AUC of both agents	Inhibition of alcohol dehydrogenase and UDP-glucuronyl transferase by interacting drugs
	ethanol	*increase* Cmax of Abacavir by 60% in 0.1% ethanol	Inhibition of alcohol dehydrogenase
Adefovir (Preveon, Bis-POM PMEA)	Other Nephrotoxic agents	There are no data on the coadministration of adefovir and other nephrotoxic agents.	
Ampenavir (141W94)	Efavirenz	*decrease* 36% AUC, *decrease* 39% Cmax, *decrease* 45% Cmin of Amprenavir	CYP3A4 induction by efavirenz

	Rifabutin	*decrease* 141W94 AUC by 15%, *decrease* 141 Cmax by 7%, *decrease* 141 Cmin 15%. *increase* rifabutin AUC by 204%, *increase* Cmax by 127%, Cmin by 349%. Dose of rifabuatin should be reduced to 150mg qd.	CYP3A4 induction by rifabutin
	Rifampin	*decrease* 141W94 by AUC 82%, *decrease* 141 Cmax by 70%, *decrease* 141 Cmin by 92%. **Do not coadminister**	CYP3A4 induction by rifampin
	Indinavir	*decrease* IDV AUC by 38%, Cmin by 27%, Cmax by 22%. Consider dose increase of IDV to 1000mg	
Delavirdine (Rescriptor)	Terfenadine (Seldane) Astemizole (Hismanal) Cisapride (Propulsid) Pimozide (Orap) Amiodarone Quinidine Ergot alkaloids	*increase* serum levels of listed medications. Potential for serious and /or life-threatening arrhythmias. **Do not coadminister**	
	Saquinavir (Invirase)	*increase* saquinavir AUC (5x). *decrease* delavirdine trough serum levels (15 $\pm$ 16%).	CYP3A4 inhibition by delavirdine
Interacting Drugs		**Effect**	**Mechanism**
Delavirdine cont'd	Ritonavir (Norvir)	*increase* ritonavir AUC by 78%, possible increase in adverse effects of RTV	
	Indinavir (Crixivan)	*increase* indinavir AUC by 150%, decrease in indinavir Cmax, increase in Cmin. Indinavir dose reduction to 600mg should be considered	CYP3A4 inhibition by delavirdine
	Nelfinavir	*increase* nelfinavir AUC by 2X, *decrease* DLV levels by 40%. Increased incidence of neutropenia and leukopenia	

Didanosine (Videx)	*decrease* delavirdine and didanosine AUC's when administered together. Separate dosing by at least one hour.	
Clarithromycin (Biaxin)	*increase* delavirdine AUC (44 ± 50%). *increase* clarithromycin AUC (100%)	
Ketoconazole (Nizoral)	*increase* delavirdine trough serum levels (50%).	CYP3A4 inhibition by delavirdine
Rifabutin (Mycobutin)	*decrease* delavirdine trough serum levels (80 ± 10%), *decrease* AUC by 3X. *increase* rifabutin AUC 150%	CYP3A4 inhibition by rifabutin
Rifampin	*decrease* delavirdine trough serum levels (96 ± 4%).	CYP3A4 inhibition by rifampin
Cimetidine (Tagamet) Famoditine (Axid) Nizatidine Ranitidine (Zantac) Omeprazole (Prilosec) Lansoprazole	May delay and reduce delavirdine absorption. Concomitant administration not advised.	
Phenytoin (Dilantin) Phenobarbital Carbamazepine (Tegretol)	*decrease* delavirdine trough serum levels	CYP3A4 induction by drug in second column
Fluoxetine (Prozac)	*increase* delavirdine trough serum levels (50%)	CYP2C9 inhibition by fluoxetine
Antacids	*decrease* delavirdine serum levels (41 ± 9%). Separate dosing by one hour.	
Dapsone Warfarin Calcium channel blockers	*increase* levels of second drug, possibly significant	CYP3A4 or 2C9 inhibition by delavirdine

Didanosine (ddI, Videx) *Note: Because of buffer in tablets, all other drugs should be administered at least 2 hours before or after didanosine.*	Pentamidine Stavudine (d4T, Zerit) Vinca Alkaloids Paclitaxel (Taxol) Zalcitibine (ddC, Hivid)	*increase* risk for pancreatitis. Monitor symptoms.	Additive toxicity.
	Stavudine (d4T, Zerit) Zalcitibine (ddC, Hivid)	*increase* risk for peripheral neuropathy. Monitor symptoms.	Additive toxicity
Interacting Drugs		**Effect**	**Mechanism**
Didanosine cont'd	Delavirdine (Rescriptor)	*decrease* delavirdine and didanosine AUC's when administered together. Separate dosing by at least one hour.	
	Ganciclovir (Cytovene)	*increase* didanosine AUC and *decrease* ganciclovir AUC. Monitor for toxicity and compromised ganciclovir effect.	Unknown
Efavirenz (Sustiva, DMP-266)	Terfenidine (Seldane) Astemizole (Hismanal) Cisapride (Propulsid) Triazolam (Halcion) Midazolam (Versed)	*increase* serum levels of listed medications. Potential for serious and /or life-threatening arrhythmias. **Do not coadminister.**	CYP3A4 inhibition by efavirenz
	Indinavir	*decrease* serum levels of indinavir by 30-35%. Dose of indinavir may be increased to 1000mg q8h	CYP3A4 induction by efavirenz
	Saquinavir	*decrease* serum levels of saquinavir by 60%, *decrease* serum levels of efavirenz by 10%. **Invirase preparation - Do not coadminister. Fortovase preparation - Coadminister with caution.**	
	141W94 (Amprenavir)	*decrease* 36% AUC, *decrease* 39% Cmax, *decrease* 45% Cmin of Amprenavir	

	Rifampin	*decrease* 33% AUC of EFV. Dose increase to 800 mg qd of EFV should be considered	
	Nelfinavir	*increase* 26% in AUC of nelfinavir	CYP3A4 inhibition by efavirenz
	Clarithromycin	*decrease* 39% in serum concentrations of clarithromycin. *increase* 34% 14-OH metabolite AUC. Alternative agents should be considered.	
Indinavir (Crixivan)	Ketoconazole (Nizoral)	*increase* indinavir AUC (68% ± 48%). Consider indinavir dose reduction to 600 mg every 8 hours.	CYP3A4 inhibition by ketoconazole
	Rifabutin (Mycobutin)	*increase* rifabutin AUC (204% ± 142%). Reduce rifabutin dose by 50%. *decrease* indinavir AUC (32% ± 19%).	CYP3A4 inhibition by indinavir
	Rifampin	Possible *decrease* in indinavir plasma concentrations. **Do not coadminster.**	CYP3A4 induction by rifampin
	Terfenidine (Seldane) Astemizole (Hismanal) Cisapride (Propulsid) Pimozide (Orap) Amiodarone Quinidine Ergot alkaloids	*increase* antihistamine, cisapride serum levels. Potential for serious and /or life-threatening arrhythmias. **Do not coadminister.**	CYP3A4 inhibition by indinavir
	Delavirdine (Rescriptor)	IDV AUC*increase* by 150%, decrease in IDV Cmax, increase in IDV Cmin. Dose reduction for IDV to 600mg can be considered.	CYP3A4 inhibition by delavirdine
	Efavirenz	*decrease* serum levels of indinavir by 30-35%. Dose of indinavir may be increased to 1000mg q8h	CYP3A4 induction by efavirenz
Interacting Drugs		**Effect**	**Mechanism**

Indinavir cont'd	Nevirapine (Viramune)	*decrease* IDV AUC (28%); *decrease* NVP AUC (<10%); Increase IDV dose to 1000mg	CYP450 3A induction by nevirapine
	Nelfinavir (Viracept)	IDV AUC *increase* (51%); NFV AUC*increase* (83%)	CYP3A inhibition by IDV and NFV
	Ritonavir	*increase* IDV AUC by 480%, *increase* t1/2 to 5.8 hours. Eliminates some IDV pharmacokinetic variability and need to take IDV on empty stomach.	CYP3A inhibition by CYP3A4
	Midazolam (Versed) Triazolam (Halcion)	*increase* benzodiazepine serum levels. Potential for prolonged sedation.	Competition for CYP3A4
Lamivudine (3TC, Epivir)	Zidovudine (AZT, ZDV, Retrovir)	*increase* zidovudine C_{max}. Clinical studies of the combination indicate no *increase* in zidovudine toxicity.	
	Trimethoprim/sulfamethoxazole (Bactrim, Septra)	*increase* lamivudine AUC. Clinical studies show no increased toxicity.	
Nelfinavir (Viracept)	Terfenidine (Seldane) Astemizole (Hismanal) Cisapride (Propulsid) Pimozide (Orap) Amiodarone Quinidine Ergot alkaloids	*increase* serum levels of listed medications. Potential for serious and /or life-threatening arrhythmias. **Do not coadminister.**	CYP3A4 inhibition by nelfinavir
	Carbamazepine Phenytoin Phenobarbital	*decrease* in nelfinavir AUC to potentially ineffective levels , Do not coadminister	CYP3A4 induction by interacting drugs
	Ethinyl estridiol (Birth control pills)	*decrease* plasma concentrations of ethinyl estridiol - possible failure of birth control	Glucuronyl transferase induction by nelfinavir (?)

	Saquinavir	*increase* SQV AUC by 12.7X, *increase* SQV Cmax 10.1X *increase* NLF AUC 8.4X, *increase* Cmax by 7.8X	
	Delavirdine	*increase* nelfinavir AUC by 2X, *decrease* DLV levels by 40%. >20% Incidence of neutropenia/leukopenia with combination. **Coadminister with cuation**	
	Efavirenz	*increase* 26% in AUC of nelfinavir	CYP3A4 inhibition by efavirenz
	Rifabutin	*increase* rifabutin AUC by 200%, *decrease* in nelfinavir AUC by 32%. Decrease rifabutin dose by 50%	
	Ketoconazole (Nizoral)	*increase* nelfinavir AUC	CYP3A inhibition by ketoconazole
	Rifampin	*decrease* nelfinavir AUC by 80%. **Do not coadminister**	CYP3A induction by rifampin
	Ritonavir (Norvir)	NFV AUC*increase* (152%)	CYP3A inhibition by RTV
Nevirapine (Viramune)	Ritonavir (Norvir)	No effect	
	Indinavir (Crixivan)	*decrease* IDV AUC (28%); *decrease* NVP AUC (<10%); Increase IDV dose to 1000mg	CYP450 3A induction by nevirapine
Interacting Drugs		**Effect**	**Mechanism**
Nevirapine cont'd	Rifampin	*decrease* NVP avg. conc. 58%, *decrease* NVP Cmin 68%. Dose increase of NVP to 300mg bid should be considered. **Coadminister with Caution**	

	Oral Contraceptives	*decrease* in ethinyl estradiol and norethindrone levels Alternative levels of birth control should be used	
	Indinavir (Crixivan)	IDV AUC *increase* (51%); NFV AUC *increase* (83%)	CYP450 3A inhibition by IDV and NFV
	Beta blockers Doxycycline Felodipine (Plenfil) Griseofulvin Methadone Metronidazole (Flagyl) Nifedipine Quinidine Steroids Theophylline Warfarin (Coumadin)	*decrease* plasma concentrations of drug in second column. Based on data from ketoconazole drug interactions.	Enzyme induction by nevirapine
	Saquinavir (Invirase)	*decrease* SQV AUC (27%); *decrease* NVP AUC (3%)	CYP450 3A induction by nevirapine
Interacting Drugs		**Effect**	**Mechanism**
Ritonavir (Norvir)	Amiodarone (Cordarone) Astemizole (Hismanal) Beperidil (Vascor) Bupropion (Wellbutrin) Cisapride (Propulsid) Clozapine (Clozaril) Dihydroergotamine (DHE 45) Encainide (Enkaid) Ergotamine (Ergostat, Wigraine, Cafergot, Ercaf, Cafatine, Caretrate) Flecanide (Tambocor) Loratadine (Claritin) Meperidine (Demerol) Piroxicam (Feldene) Propafenone (Rythmol) Propoxyphene (Darvon, Darvocet) Quinidine Rifabutin (Mycobutin) Terfenidine (Seldane) Pimozide (Orap)	*increase* plasma concentrations of drug in second column. Potential for serious toxicities **Do not coadminister.** **Limited experience with loratadine and ritonavir used concomitantly has been reported. May be considered as an alternative agent for contraindicated non-sedating antihistamines.** **Coadminister with caution.**	

	Clorazepate (Klonopin) Diazepam (Valium) Estazolam (ProSom) Flurazepam (Dalmane) Midazolam (Versed) Triazolam (Halcion) Zolpidem (Ambien)	*increase* plasma concentrations of drug in second column. Potential for extreme sedation and respiratory depression. **Do not coadminister**.	
Interacting Drugs		**Effect**	**Mechanism**
Ritonavir (Norvir), cont.	Alfentanil (Alfenta) Amlodipine (Norvasc) Carbamezepine (Tegretol) Clonazepam (Klonopin) Cylcosporine (Sandimmune) Dexamethasone Diltiazem (Cardiazem) Disopyramide (Norpace) Dronabinol (Marinol) Erythromycin Ethosuximide (Zarontin) Etoposide Fentanyl (Duragesic) Felodipine (Plendil) Isradipine (DynaCirc) Lidocaine Lovastatin (Mevacor) Nefazodone (Serzone) Nicardipine (Cardine) Nifedipine (Procardia, Adalat) Nimodipine (Nimotop) Nisoldipine (Sular) Ondansetron (Zofran) Paclitaxel (Taxol) Pravastatin (Pravachol) Prednisone Quinine Rifampin	> 3x *increase* AUC of drug in second column. Coadminster with caution. Monitor drug levels when available.	CYP3A4 inhibition by ritonavir
Ritonavir (Norvir), cont.	Saquinavir (Invirase) Sertraline (Zoloft) Tamoxifen (Nolvadex) Tacrolimus (Prograf) Trazodone (Desyrel) Verapamil (Calan, Isoptin) Vinblastine Vincristine Warfarin, R-enantiomer (Coumadin)	> 3x *increase* AUC of drug in second column. Coadminster with caution. Monitor drug levels when available.	CYP3A4 inhibition by ritonavir

	Amitriptyline (Elavil) Chlorpromazine (Thorazine) Clomipramine (Anafranil) Desipramine (Norpramin, Pertofrane) Fluoxetine (Prozac) Haloperidol (Haldol) Hydrocodone (Hycodan) Imipramine (Tofranil) Maprotiline (Ludiomil) Methamphetamine (Desoxyn) Metoprolol (Lopressor) Mexiletine (Mexitil) Nortriptyline (Aventyl, Pamedor) Oxycodone (Percocet, Percodan) Paroxetine (Paxil) Perphenazine (Trilafon) Pindolol (Visken) Propranolol (Inderal) Risperidone Risperdal) Thioridazine (Mellaril) Timolol (Blocadren) Tramadol (Ultram) Venlafaxine (Effexor)	1.5 - 3x *increase* AUC of drug in second column.	CYP2D6 inhibition by ritonavir
Ritonavir (Norvir), cont.	Diclofenac (Cataflam, Voltaren) Glipizide (Glucotrol) Glyburide Iboprofen Indomethacin Lansoprazole (Prevacid) Omeprazole (Prilosec) Losartan (Cozaar) Phenytoin (Dilantin) Proguanil Tolbutamide Warfarin, S-enantiomer (Coumadin)	1.5 - 3x *increase* or *decrease* in AUC of drug in second column. Monitor need for increased dose or toxicity.	CYP2C9/19 competition
	Acebutolol (Sectral) Albendazole Betaxolol (Kerlone) Chloroquine Cimetidine Cyclophosphamide Daunorubicin Digoxin Doxazosin (Cardura) Doxepin (Sinequan) Doxorubicin Fluvastatin (Lescol) Fluvoxamine (Luvox) Gemfibrozil (Gemcor, Lopid) Itraconazole (Sporonax) Ketoconazole (Nizoral) Miconazole (Monistat) Methadone Methylphenidate (Ritalin) Metronidazole (Flagyl) Nabumetone (Relafen)	Possible *increase* AUC of drug in second column. Monitor drug levels when available.	Unknown

	Penbutolol (Levatol) Pentoxifylline (Trental) Phenobarbital		
Ritonavir (Norvir), cont.	Prazosin (Minpress) Primaquine Prochlorperazine (Compazine) Promethazine (Phenergan) Pyrimethamine Simvastatin (Zocor) Sulindac (Clinoril) Tocainide (Tonocard) Terazosin (Hytrin)	Possible *increase* AUC of drug in second column. Monitor drug levels when available.	Unknown
	Disulfiram (Antabuse) Sulfonylurea agents	Possible disulfiram reaction.	Both capsule and solution preparation contain ethanol.
	Atovaquone (Mepron) Clofibrate (Atromid-S) Codeine Diphenoxylate (Lomotil) Divalproex (Depakote) Hydromorphone (Dilaudid) Ketoprofen (Orudis) Ketorolac (Tramadol) Lamotrigine (Lamictel) Lorazepam (Ativan) Metoclopramide (Reglan) Morphine Naproxen (Naprosyn) Oxazepam (Serax) Propofol (Diprivan) Temazepam (Restoril) Theophylline	Possible *decrease* AUC of drug in second column. Monitor need for increased dose	Increased glucuronidation
	Theophylline	*decrease* AUC of theophylline (43%)	Induction of CYP1A2
	Ethinyl estradiol (Birth control pills)	*decrease* AUC of ethinyl estradiol (41%)	Induction of glucuronyl transferase
Saquinavir (Invirase)	Ketoconazole (Nizoral)	*increase* saquinavir AUC. No adjustment necessary.	CYP3A inhibition
	Terfenadine (Seldane) Astemizole (Hismanal) Cisapride (Propulsid) Pimozide (Orap)	*increase* antihistamine, cisapride serum levels. Potential for serious and /or life-threatening arrhythmias. **Do not coadminister.**	CYP3A inhibition

	Delavirdine (Rescriptor)	*increase* saquinavir AUC by 5X	
	Efavirenz	*decrease* serum levels of saquinavir by 60%, *decrease* serum levels of efavirenz by 10%. **Coadminister with caution.**	CYP3A induction by efavirenz
	Phenobarbital Carbamazepine Phenytoin	May decrease saquinavir levels to subtherapeutic **Coadminister with caution**	CYP3A induction
	Nelfinavir	*increase* SQV AUC by 12.7X, *increase* SQV Cmax 10.1X *increase* NLF AUC 8.4X, *increase* Cmax by 7.8X	
	Rifampin	*decrease* saquinavir AUC by 80%. **Do not coadminister.**	CYP3A induction
	Ritonavir (Norvir)	> 30x *increase* AUC of saquinavir	CYP3A inhibition by ritonavir
Saquinavir (Fortovase)	Ritonavir	20x *increase* AUC of SQV (full dose)	
	Nelfinavir	*increase* 392% of SQV AUC, *increase* 179% of SQV Cmax	
	Efavirenz	*decrease* serum levels of saquinavir by 60%, *decrease* serum levels of efavirenz by 10%. **Coadminister with caution.**	CYP3A induction by efavirenz
	Indinavir	*increase* 620% of SQV AUC, *increase* 551% of SQV Cmax	
	Phenobarbital Carbamazepine Phenytoin	May decrease saquinavir levels to subtherapeutic **Coadminister with caution**	CYP3A induction

	Clarithromycin	*increase* 177% of SQV AUC, *increase* 187% SQV Cmax *increase* 45% of Clarithromycin AUC, *increase* 39% in Clarithromycin Cmax, *decrease* 24 14-OH metabolite AUC, *decrease* 34% 14-OH metabolite Cmax.	
Stavudine (d4T, Zerit)	Didanosine (ddI, Videx) Zalcitibine (ddC, Hivid)	*increase* risk of peripheral neuropathy. Monitor symptoms.	Additive toxicity
	Didanosine (ddI, Videx) Zalcitibine (ddC, Hivid)	*increase* risk of pancreatitis. Monitor symptoms.	Additive toxicity
	Zidovudine	Antagonistic *in vivo* - **Do not coadminister.**	Competition for phosphorylation
Zalcitibine (ddC, Hivid)	Didanosine (ddI, Videx) Pentamidine Stavudine (d4T, Zerit)	*increase* risk of pancreatitis. Monitor symptoms.	Additive toxicity
	Didanosine (ddI, Videx) Stavudine (d4T, Zerit) Vinca alkaloids Lamivudine	*increase* risk of peripheral neuropathy. Monitor symptoms.	Additive toxicity
Zidovudine (AZT, ZDV, Retrovir)	Amphotericin B Chemotherapeutic agents Dapsone Flucytosine (5FC, Ancobon) Ganciclovir (Cytovene) Hydroxyurea Primaquine Pyrimethamine (Daraprim) Sulfadiazine Trimethoprim/sulfamethoxazole Trimetrexate (Neutrexin)	*increase* risk for hematologic toxicity. Monitor symptoms.	Additive toxicity
	Acetaminophen NSAID's	*increase* zidovudine AUC - Not often clinically significant. Monitor zidovudine toxicity.	*decrease* zidovudine metabolism (glucuronidation)
	Fluconazole (Diflucan)	*increase* zidovudine AUC. Monitor for toxicity.	

	Phenytoin (Dilantin)	*decrease* phenytoin levels. Monitor phenytoin serum levels.	
	Probenecid (Benemid)	*increase* zidovudine AUC. Monitor zidovudine toxicity.	
	Stavudine	Antagonistic *in vivo* - **Do not coadminister**	Competition for phosphorylation

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Antifungals

Interacting Drugs			Effect	Mechanism
Amphotericin B	Aminoglycosides Cidofovir (Vistide) Foscarnet (Foscavir) Furosemide (Lasix)	NSAID's Pentamidine	*increase* risk for nephrotoxicity	Additive toxicity
	Chemotherapeutic agents Dapsone Flucytosine (5FC, Ancobon) Ganciclovir (Cytovene) Primaquine Cidofovir Hydroxyurea	Pyrimethamine (Daraprim) Sulfadiazine Trimethoprim/sulfamethoxazole Trimetrexate (Neutrexin) Zidovudine (AZT, ZDV, Retrovir)	*increase* risk for hematologic toxicity. Monitor symptoms.	Additive toxicity

Interacting Drugs			Effect	Mechanism
Flucytosine (5FC, Ancobon)	Amphotericin B Chemotherapeutic agents Dapsone Ganciclovir (Cytovene) Primaquine Cidofovir Hydroxyurea	Pyrimethamine (Daraprim) Sulfadiazine Trimethoprim/sulfamethoxazole Trimetrexate (Neutrexin) Zidovudine (AZT, ZDV, Retrovir)	*increase* risk for hematologic toxicity. Monitor symptoms.	Additive toxicity

Fluconazole (Diflucan)	H_2 antagonists Rifampin	*decrease* fluconazole AUC. Avoid coadministration.	
	Cyclosporine (Sandimmune) Sulfonylureaas Phenytoin (Dilantin)	*increase* activity/serum level of drug in second column. Monitor effect.	
	Warfarin (Coumadin)	*increase* warfarin activity, possible bleeding. Monitor bleeding times.	*decrease* warfarin metabolism
	Hydrochlorothiazide	*increase* fluconazole AUC.	*decrease* fluconazole renal clearance
Fluconazole cont'd	Rifabutin (Mycobutin)	Possibly *increase* 'd rifabutin plasma levels. Monitor for rifabutin toxicity (uveitis).	
	Delavirdine (Rescriptor)	*increase* AUC of delavirdine (up to 30%)	CYP3A4 inhibition
	Astemizole (Hismanal) Cisapride (Propulsid) Terfenidine (Seldane) Pimozide (Orap)	*increase* AUC of drug or metabolite of drug in second column, all of which have been associated with serious cardiac arrythmias. **Do not coadminister.**	CYP3A4 inhibition

	Oral contraceptives		Possible *decrease* or *increase* in oral contraceptive component plasma levels. Coadminister with caution.	
Itraconazole (Sporanox)	Astemizole (Hismanal) Cisapride (Propulsid) Terfenidine (Seldane) Pimozide (Orap)		*increase* AUC of drug or metabolite of drug in second column, all of which have been associated with serious cardiac arrythmias. **Do not coadminister**.	CYP3A4 inhibition
	Antacids		*decrease* itraconazole serum levls.	*decrease* oral absorption
	Calcium channel blockers Cyclosporine (Sandimmune) Digoxin Midazolam (Versed) Triazolam (Halcion)	Quinidine Sulfonylureas Tacrolimus (Prograf) Warfarin (Coumadin)	*increase* AUC of drug in second column. Monitor for toxicity.	
	H_2 antagonists Rifampin		*decrease* itraconazole AUC. Avoid coadministration.	
	Carbamazepine (Tegretol) Phenytoin (Dilantin)		*decrease* itraconazole AUC and/or *increase* phenytoin levels possible. Monitor phenytoin, itraconazole effect.	
	Isoniazid		*decrease* itraconazole serum levels. Avoid coadministration.	

	Ritonavir (Norvir)	Possible *increase* AUC of drug in second column. Monitor drug levels when available.	Unknown.
Interacting Drugs		**Effect**	**Mechanism**
Ketoconazole (Nizoral)	Antacids H_2 antagonists Isoniazid	*decrease* ketoconazole serum levels. Avoid coadministration.	Decreased ketoconazole oral absorption
	Astemizole (Hismanal) Cisapride (Propulsid) Terfenidine (Seldane) Pimozide (Orap)	*increase* AUC of drug or metabolite of drug in second column, all of which have been associated with serious cardiac arrythmias. **Do not coadminister**.	CYP3A4 inhibition
	Indinavir (Crixivan)	*increase* indinavir AUC (68% + 48%). Consider indinavir dose reduction to 600 mg every 8 hours..	Unknown
	Rifampin	*decrease* ketoconazole or rifampin serum levels. Avoid coadministration.	
	Corticosteroids Cyclosporine (Sandimmune) Warfarin (Coumadin)	*increase* AUC of drug in second column. Monitor for toxicity.	
	Ritonavir (Norvir)	Possible *increase* AUC of ritonavir.	Unknown
	Delavirdine (Rescriptor)	*increase* trough delavirdine plasma levels (50%)	CYP3A4 inhibition

	Theophyllines	*decrease* theophylline serum levels.	

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Antivirals

Interacting Drugs		Effect	Mechanism
Acyclovir (Zovirax)	Probenecid (Benemid)	*increase* acylcovir serum levels. Monitor for toxicity.	*decrease* renal clearance of acyclovir
	Aminoglycosides Amphotericin B Cidofovir (Vistide) Furosemide (Lasix) NSAID's Pentamidine	*increase* risk for nephrotoxicity	Additive toxicity
Cidofovir (Vistide)	Aminoglycosides Amphotericin B Cidofovir (Vistide) Furosemide (Lasix) NSAID's Pentamidine Nephrotoxic agents	*increase* risk for nephrotoxicity	Additive toxicity
	Amphotericin B Chemotherapeutic agents Dapsone Flucytosine (5FC, Ancobon) Hydroxyurea Primaquine Pyrimethamine (Daraprim) Sulfadiazine Trimethoprim/sulfamethoxazole (Bactrim, Septra) Trimetrexate (Neutrexin) Zidovudine (AZT, ZDV, Retrovir)	*increase* risk for hematologic toxicity. Monitor symptoms.	Additive toxicity
Foscarnet (Foscavir)	Aminoglycosides Amphotericin B Cidofovir (Vistide) Furosemide (Lasix) NSAIDS's Pentamidine Nephrotoxic agents	*increase* risk for nephrotoxicity.	Additive toxicity

Ganciclovir (Cytovene)	Amphotericin B Chemotherapeutic agents Dapsone Flucytosine (5FC, Ancobon) Primaquine Pyrimethamine (Daraprim) Sulfadiazine Trimethoprim/sulfamethoxazole (Bactrim, Septra) Trimetrexate (Neutrexin) Zidovudine (AZT, ZDV, Retrovir)	*increase* risk for hematologic toxicity. Monitor symptoms.	Additive toxicity
	Imipenem-cilastin	*increase* risk for seizures. Avoid coadministration.	
	Probenecid	*increase* ganciclovir AUC. Monitor for toxicity.	*decrease* renal clearance of ganciclovir
	Didanosine (ddI, Videx)	*increase* didanosine AUC and *decrease* ganciclovir AUC. Monitor for toxicity and compromised ganciclovir effect.	

Antiretrovirals || Antifungals || Antivirals || Anti-Pneumocystis || Anti-Mycobacterial || Anti-Toxoplasma || Anti-Wasting

Anti-Pneumocystis

Interacting Drugs			Effect	Mechanism
Atovaquone (Mepron)	Ritonavir (Norvir)		Possible *decrease* atovaquone AUC.	

Interacting Drugs			Effect	Mechanism
Dapsone	Amphotericin B Chemotherapeutic agents Cyclosporine Delavirdine (Rescriptor) Flucytosine (5FC, Ancobon) Primaquine	Pyrimethamine (Daraprim) Sulfadiazine Trimethoprim/sulfamethoxazole (Bactrim, Septra) Trimetrexate (Neutrexin) Zidovudine (AZT, ZDV, Retrovir)	*increase* risk for hematologic toxicity. Monitor symptoms.	Additive toxicity

Pentamidine	Didanosine (ddI, Videx) Stavudine (d4T, Zerit) Vinca Alkaloids	Paclitaxel (Taxol) Zalcitibine (ddC, Hivid)	*increase* risk for pancreatitis. Monitor symptoms.	Additive toxicity
	Aminoglycosides Amphotericin B Cidofovir (Vistide) Furosemide (Lasix)	NSAIDS's Foscarnet Nephrotoxic agents	*increase* risk for renal toxicity	Additive toxicity
Primaquine	Amphotericin B Chemotherapeutic agents Cyclosporine Dapsone Flucytosine (5FC, Ancobon) Pyrimethamine (Daraprim) Ganciclovir	Hydroxyurea Sulfadiazine Trimethoprim/sulfamethoxazole (Bactrim, Septra) Trimetrexate (Neutrexin) Zidovudine (AZT, ZDV, Retrovir) Cidofovir	*increase* risk for hematologic toxicity. Monitor symptoms.	Additive toxicity
Trimethoprim/sulfamethoxazole (Bactrim, Septra)	Amphotericin B Chemotherapeutic agents Cyclosporine Dapsone Flucytosine (5FC, Ancobon) Ganciclovir	Primaquine Pyrimethamine (Daraprim) Sulfadiazine Trimetrexate (Neutrexin) Zidovudine (AZT, ZDV, Retrovir) Cidofovir	*increase* risk for hematologic toxicity. Monitor symptoms.	Additive toxicity
	Lamivudine (3TC, Epivir)		*increase* lamivudine AUC. Clinical studies show no increased toxicity.	
Trimetrexate (Neutrexin)	Amphotericin B Chemotherapeutic agents Dapsone Flucytosine (5FC, Ancobon) Pyrimethamine (Daraprim) Primaquine Ganciclovir	Sulfadiazine Trimethoprim/sulfamethoxazole (Bactrim, Septra) Trimetrexate (Neutrexin) Zidovudine (AZT, ZDV, Retrovir) Cidofovir	*increase* risk for hematologic toxicity. Monitor symptoms.	Additive toxicity

	H2 antagonists Macrolide antibiotics	Triazole antifungals	*increase* trimetrexate AUC. Monitor for increased hematologic toxicity.	*decrease* renal clearance of trimetrexate

Antiretrovirals || Antifungals || Antivirals || Anti-Pneumocystis || Anti-Mycobacterial || Anti-Toxoplasma || Anti-Wasting

Anti-Mycobacterial

Interacting Drugs		Effect	Mechanism
Aminoglycosides	Amphotericin B Cidofovir (Vistide) Foscarnet (Foscavir) Furosemide (Lasix) NSAIDS's Pentamidine Nephrotoxic agents	*increase* risk for nephrotoxicity.	Additive toxicity
Azithromycin (Zithromax)	None reported		
Ciprofloxacin (Cipro)	Antacids Iron salts Zinc salts Sucralfate	*decrease* absorption of ciprofloxacin. Separate administration by at least 2 hours.	Chelation, alterered oral absorption
	Caffeine Theophylline	*increase* AUC of drug in second column. Monitor for increased toxicity.	Decreased clearance of xanthines
	Warfarin (Coumadin)	*increase* prothrombin time (PT). Monitor PT.	Not known
Clarithromycin (Biaxin)	Astemizole (Hismanal) Cisapride (Propulsid) Terfenidine (Seldane) Pimozide (Orap)	*increase* AUC of drug or metabolite of drug in second column, all of which have been associated with serious cardiac arrythmias. **Do not coadminister**.	CYP3A4 inhibition
	Carbamazepine (Tegretol) Theophylline	*increase* AUC of drug in second column. Monitor serum levels.	

	Efavirenz	*decrease* 38% decrease in serum concentrations of clarithromycin. Alternative agents should be considered.	P450 induction by efavirenz
	Delavirdine (Rescriptor)	*increase* AUC of delavirdine (44 ± 50%). *increase* clarithromycin AUC (100%).	
Ethambutol (Myambutol)	Aluminum salts	*decrease* absorption of ethambutol. Separate administration by at least 2 hours.	Alterered oral absorption
Isoniazid	Aluminum salts	*decrease* absorption of ethambutol. Separate administration by at least 2 hours.	Alterered oral absorption
	Benzodiazepines Phenytoin (Dilantin)	*increase* AUC of drug in second column. Monitor serum levels when available.	*decrease* hepatic metabolism
	Warfarin (Coumadin)		
Rifabutin(Mycobutin)	Fluconazole (Diflucan)	*increase* rifabutin AUC. Monitor for rifabutin toxicity.	*decrease* hepatic metabolism
	Amprenavir (141W94)	*increase* rifabutin AUC (204%). Reduce rifabutin dose by 50%.	CYP3A4 competition
	Indinavir (Crixivan)	*increase* rifabutin AUC (204% + 142%). Reduce rifabutin dose by 50%. *decrease* indinavir AUC (32% + 19%). Monitor for indinavir toxicity.	CYP3A4 competition
	Nelfinavir	*increase* in rifabutin AUC by 200%, *decrease* in nelfinavir AUC by 32%. Decrease rifabutin dose by 50%	
	Amprenavir	*decrease* 141W94 AUC by 14%, *decrease* 141 Cmax by 5%, *decrease* 141 Cmin 10%	

	Ritonavir (Norvir)	*increase* rifabutin plasma levels. Potential for serious toxicities, **Do not co-administer.**	CYP3A4 inhibition by ritonavir
	Delavirdine (Rescriptor)	*decrease* trough serum levels of delavirdine (80 ± 10%). *increase* rifabutin AUC (100%). **Do not co-administer**	CYP3A4 induction by rifabutin
	Saquinavir (Invirase)	*decrease* saquinavir AUC by 40%. **Avoid coadministration**.	CYP3A4 induction by rifabutin
Rifampin	Indinavir (Crixivan)	Possible *decrease* in indinavir plasma concentrations. **Do not coadminster.**	CYP3A4 induction by rifampin
	Nelfinavir	*decrease* AUC by 82% of nelfinavir. Do Not Coadminister	CYP3A4 induction by rifampin
	Amprenavir	*decrease* 141W94 by AUC 81%, *decrease* 141 Cmax by 67%, *decrease* 141 Cmin by 91%	
	Ritonavir (Norvir)	*increase* plasma concentrations of rifampin. Potential for serious toxicities, **Do not co-administer.**	CYP3A4 inhibition by ritonavir
	Delavirdine (Rescriptor)	*decrease* trough serum levels of delavirdine (96 ± 4%). **Do not co-administer**	CYP3A4 induction by rifampin
	Ketoconazole (Nizoral)	*decrease* serum levels of either drug may occur	CYP3A4 competition
	Saquinavir (Invirase)	*decrease* saquinavir AUC by 80%. **Do not coadminister**.	CYP3A4 induction by rifampin

Anti-Toxoplasma

Interacting Drugs		Effect	Mechanism
Pyrimethamine	Amphotericin B Chemotherapeutic agents Dapsone Flyctosine (5FC, Ancobon) Ganciclovir (Cytovene) Primaquine Sulfadiazine Trimethoprim/sulfamethoxazole (Bactrim, Septra) Trimetrexate (Neutrexin) Zidovudine (AZT, ZDV, Retrovir) Cidofovir	*increase* risk for hematologic toxicity. Monitor symptoms.	Additive toxicity

Interacting Drugs		Effect	Mechanism
Sulfadiazine	Amphotericin B Chemotherapeutic agents Dapsone Flyctosine (5FC, Ancobon) Ganciclovir (Cytovene) Primaquine Pyrimethamine (Daraprim) Trimethoprim/sulfamethoxazole (Bactrim, Septra) Trimetrexate (Neutrexin) Zidovudine (AZT, ZDV, Retrovir) Cidofovir	*increase* risk for hematologic toxicity. Monitor symptoms.	Additive toxicity

Antiretrovirals || Antifungals || Antivirals || Anti-Pneumocystis || Anti-Mycobacterial || Anti-Toxoplasma || Anti-Wasting

Anti-Wasting

Interacting Drugs		Effect	Mechanism
Dronabinol (Marinol)	Ritonavir (Norvir)	> 3x *increase* AUC of dronabinol. Coadminster with caution. Monitor drug levels when available.	CYP3A 4 inhibition by ritonavir
Megestrol (Megace)			
Nandrolone			
Testosterone			

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