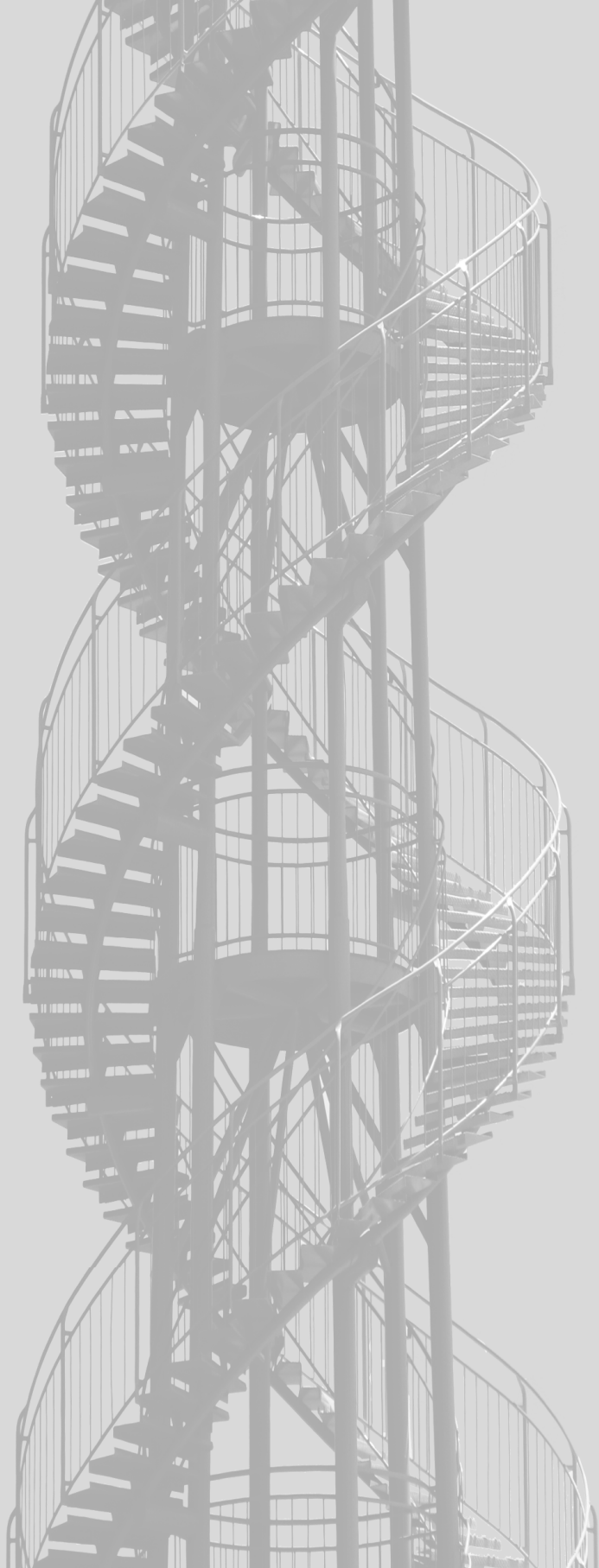


## Appendix



## Appendix

In the appendix drugs and other substances metabolized by and influencing (inhibit or induce) the most important CYP enzymes are listed. The drugs are subdivided into substrates, inhibitors, and inducers. The term substrate refers to a drug or other substance that is metabolized (activated or de-activated) by an enzyme. An inhibitor is a substance that inhibits the normal function of an enzyme and may result from non-competitive or competitive inhibition by a second drug or other substance, an effect that may occur rapidly. The result of non-competitive inhibition by the addition of a second agent is a slower metabolism of the first substance, higher plasma concentrations, and toxicity risk. In case of competitive inhibition, the metabolism of both substances can be reduced, resulting in higher than expected and possible toxic concentrations of both parent agents. An inducer is a substance that may result in increased CYP enzyme synthesis, faster drug metabolism, subtherapeutic drug concentrations and the risk for ineffective drug therapy. The promptness of the induction depends on the half-life of the inducing substance as well as the rate of synthesis of new enzymes.

The drugs and other substances are alphabetically ordered by CYP enzyme. The list of substrates metabolized by a specific (affected) enzyme and possible present inducers and/or inhibitors might be helpful to prevent possible problems.

This appendix is not comprehensive as new information is constantly being identified.<sup>1-11</sup>

## Drugs and other substances metabolized by and influencing CYP enzymes.

**Substrates**

<b>1A2</b>		<b>2C9</b>		<b>2C19</b>	
Acetaminophen	Paroxetine	Acetofenac	Lornoxicam	Acenocoumarol	Primidone
Aminophylline	Pentazocine	Acenocoumarol	Losartan	Alprazolam	Progesterone
Amitriptyline	Perphenazine	Acetaminophen	Mefenamic acid	Amiodarone	Proguanil
Anagrelide	Phenacetin	Amitriptyline	Meloxicam	Amitriptyline	Propranolol
Bendamustine	Pimozide	Bosentan	Mefenytin	Carisoprodol	Rabeprazole
Caffeine	Pirfenidone	Candesartan	Mestranol	Chloramphenicol	Ranitidine
Chlordiazepoxide	Primaquine	Cannabinal	Mirtazapine	Cilostazol	Ritonavir
Chlorpromazine	Propafenone	Carmustine	Montelukast	Citalopram	R-Mephobarbital
Cimetidine	Propranolol	Carvedilol	Naproxen	Clobazam	R-Warfarin
Cinacalcet	Ramelteon	Celecoxib	Nateglinide	Clomipramine	Sertraline
Citalopram	Ranitidine	Chloramphenicol	Nicoumalone	Clopidogrel	S-Mefenytin
Clomipramine	Rasagiline	Chlorpheniramine	Omeprazole	Cyclophosphamide	Temazepam
Clopidogrel	Riluzole	Chlorpropamide	Paclitaxel	Desipramine	Teniposide
Clozapine	Ritonavir	Clomipramine	Paroxetine	Diazepam	Thioridazine
Cyclobenzaprine	Ropinirole	Clopidogrel	Phenobarbital	Diclofenac	Tolbutamide
Dacarbazine	Ropivacaine	Cotrimoxazol	Phenytoin	Divalproex	Trimipramine
Desipramine	R-Warfarin	Dapsone	Pirfenidone	Efavirenz	Valproic acid
Diazepam	Sertraline	Desogestrel	Piroxicam	Escitalopram	Venlafaxine
Duloxetine	Tacrine	Diazepam	Ritonavir	Esomeprazole	Voriconazole
Erlotinib	Tamoxifen	Diclofenac	Rosiglitazone	Flunitrazepam	
Estradiol	Theophylline	Dicoumarol	R-Warfarin	Fluoxetine	
Ethinyl estradiol	Thioridazine	Divalproex sodium	Seratrodist	Fluvoxamine	
Febuxostat	Thiothixene	Dronabinol	Sertraline	Formoterol	
Fluoxetine	Tizanidine	Efavirenz	Sildenafil	Hexobarbital	
Fluphenazine	Toremifene	Febuxostat	Sulfamethoxazole	Ibuprofen	
Flutamide	Trifluoperazine	Fluoxetine	Sulfaphenazole	Ifosfamide	
Fluvoxamine	Verapamil	Flurbiprofen	Sulfinpyrazone	Imipramine	
Frovatriptan	Zileuton	Fluvastatin	Sulfonamides	Indomethacin	
Haloperidol	Ziprasidone	Fluvoxamine	Suprofen	Lansoprazole	
Imipramine	Zolmitriptan	Formoterol	S-Warfarin	Loratidine	
Isotretinoin	Zolpidem	Glibenclamide	Tamoxifen	Mefenytin	
Levobupivacaine		Gliclazide	Tenoxicam	Mephobarbital	
Lidocaine		Glimepiride	Terahydrocannabinol	Methsuximide	
Melatonin		Glipizide	Testosterone	Moclobemide	
Mesoridazine		Glyburide	Tolbutamide	Nelfinavir	
Methadone		Hexobarbital	Torseamide	Nevirapine	
Mexiletine		Ibuprofen	Valdecoxib	Nilutamide	
Mibrefradil		Idarubicin	Valproic acid	Omeprazole	
Mirtazapine		Imipramine	Valsartan	Pantoprazole	
Naproxen		Indomethacin	Vardenafil	Paroxetine	
Nortriptyline		Irbesartan	Voriconazole	Pentamidine	
Olanzapine		Irinotecan	Zafirlukast	Phenobarbital	
Ondansetron		Zileuton	Ketoprofen	Phenytoin	
Oxtriphylline		Leflunomide	Zolpidem	Pirfenidone	

**Substrates****2D6**

Acetaminophen	Fentanyl	Penbutolol
Alprenolol	Flecainide	Perhexiline
Amiodarone	Flunarizine	Perphenazine
Amitriptyline	Fluoxetine	Phenacetin
Amphetamine	Fluphenazine	Phenformin
Aripiprazole	Fluvoxamine	Pindolol
Atomoxetine	Formoterol	Pirfenidone
Benzotropine	Galantamine	Procainamide
Bisoprolol	Guanoxan	Promethazine
Bufuralol	Haloperidol	Propafenone
Captopril	Hydrocodone	Propoxyphene
Carvedilol	Hydrocortisone	Propranolol
Cevimeline	Hydroxyzine	Pyrantel
Chlorpheniramine	Idarubicin	Quetiapine
Chlorpromazine	Imipramine	Quinidine
Chlorpropamide	Indinavir	Ranitidine
Cinacalcet	Indoramin	Ranolazine
Citalopram	Labetalol	Risperidone
Clemastine	Lidocaine	Ritonavir
Clomipramine	Loratadine	Ropivacaine
Clozapine	Maprotiline	Selegiline
Codeine	MDMA (ecstasy)	Sertindole
Cyclobenzaprine	Meperidine	Sertraline
Darifenacin	Mequitazine	Sparteine
Debrisoquine	Methadone	Tacrine
Delavirdine	Methamphetamine	Tamoxifen
Desipramine	Methoxyamphetamine	Tamsulosine
Dexfenfluramine	Metoclopramide	Thioridazine
Dextroamphetamine	Metoprolol	Timolol
Dextromethorphan	Mexiletine	Tolterodine
Diltiazem	Minaprine	Tramadol
Dimenhydrinate	Mirtazapine	Tranylcypromine
Dimethoxyamphetamine	Moclobemide	Trazodone
Diphenhydramine	Morphine	Trimipramine
Dolasetron	Nebivolol	Tripelennamine
Donepezil	Nefazodone	Tropisetron
Doxepin	Nifedipine	Venlafaxine
Doxorubicin	Nisoldipine	Yohimbine
Duloxetine	Nortriptyline	Zuclopenthixol
Encainide	Olanzapine	
Escitalopram	Ondansetron	
Ethylmorphine	Oxycodone	
Fenfluramine	Paroxetine	

**Substrates****3A4-5**

Acetaminophen	Cocaine	Etonogestrel	Loxapine	Primaquine	Tinidazole
Alfentanil	Codeine	Etoposide	Medroxyprogesterone	Progesterone	Tipranavir
Alfuzosin	Colchicine	Exemestane	Mefloquine	Progesterin	Tolcapone
Aliskiren	Conjugated estrogens	Felbamate	Meloxicam	Proguanil	Tolterodine
Almotriptan	Cortisol	Felodipine	Meperidine	Propafenone	Toremifene
Alprazolam	Cyclobenzaprine	Fentanyl	Methadone	Propoxyphene	Tramadol
Amiodarone	Cyclophosphamide	Fexofenadine	Methsuximide	Propranolol	Trazodone
Amitriptyline	Cyclosporine	Finasteride	Methylprednisolone	Quetiapine	Tretinoin
Amlodipine	Cytarabine	Fluconazole	Methysergide	Quinidine	Triamcinolone
Amprenavir	Danazol	Flunitrazepam	Metoprolol	Quinine	Triazolam
Anastrozole	Dapsone	Fluoxetine	Mexiletine	Rabeprazole	Trimetrexate
Aprepitant	Darifenacin	Flupenthixol	Mibefradil	Ramelteon	Trimipramine
Aranidipine	Darunavir	Flurazepam	Miconazole	Ranitidine	Trofosfamide
Aripiprazole	Dasatinib	Flutamide	Midazolam	Ranolazine	Troleandomycin
Astemizole	Daunorubicin	Fluticasone	Mifepristone	Rapamycin	Valdecoxib
Atazanavir	Delavirdine	Fluvestrant	Mirtazapine	Reboxetine	Valproic acid
Atorvastatin	Desogestrel	Fluvoxamine	Mitotane	Repaglinide	Vardenafil
Azithromycin	Dexamethasone	Fomepizole	Modafinil	Rifabutin	Venlafaxine
Bepiridil	Dextromethorphan	Fosamprenavir	Mometasone	Rifampin	Verapamil
Bexarotene	Diazepam	Galantamine	Montelukast	Risperidone	Vesnarinone
Bicalutamide	Diclofenac	Gefitinib	Nateglinide	Ritonavir	Vinblastine
Bosentan	Dihydroergotamine	Gestodene	Navelbine	Rokitamycin	Vincristine
Bromocriptine	Diltiazem	Glyburide	Nefazodone	Ropinirole	Vindesine
Budesonide	Dirithromycin	Granisetron	Nelfinavir	R-Warfarin	Vinorelbine
Buprenorphine	Disopyramide	Halofantrine	Nevirapine	Salmeterol	Voriconazole
Buspirone	Docetaxel	Haloperidol	Nicardipine	Saquinavir	Zaleplon
Busulfan	Dofetilide	Hydrocannabinol	Nifedipine	Selegiline	Zileuton
Cabergoline	Dolasetron	Hydrocodone	Nilotinib	Seratrodast	Ziprasidone
Caffeine	Domperidone	Hydrocortisone	Nimodipine	Sertraline	Zolpidem
Cannabinoids	Donepezil	Ifosfamide	Nisoldipine	Sibutramine	Zonisamide
Carbamazepine	Doxazosine	Imatinib	Nitrazepam	Sildenafil	Zopiclone
Carvedilol	Doxepin	Imipramine	Nitrendipine	Simvastatin	Zuclopenthixol
Cerivastatin	Doxorubicin	Indinavir	Nordazepam	Sirinolimus	
Cevimeline	Doxycycline	Irinotecan	Norethindrone	Solifenacin	
Chlordiazepoxide	Dronabinol	Isotretinoin	Omeprazole	Sorafenib	
Chloroquine	Dutasteride	Isradipine	Onapristone	Sparfloxacin	
Chlorpheniramine	Ebastine	Itraconazole	Ondansetron	Sufentanil	
Chlorpromazine	Efavirenz	Ketamine	Oral contraceptives	Sunitinib	
Cilnidipine	Eletriptan	Ketoconazole	Oxybutynin	Tacrolimus	
Cilostazol	Enalapril	Lamotrigine	Oxycodone	Tadalafil	
Cimetidine	Eplerenone	Lansoprazole	Paclitaxel	Tamoxifen	
Cinacalcet	Ergots	Lercanidipine	Pantoprazole	Tamsulosin	
Ciprofloxacin	Erlotinib	Letrozole	Paroxetine	Taxol	
Cisapride	Erythromycin	Levobupivacaine	Pergolide	Telithromycin	
Citalopram	Escitalopram	Levomethadyl	Perphenazine	Temazepam	
Clarithromycin	Esomeprazole	Lidocaine	Phencyclidine	Teniposide	
Clindamycin	Estazolam	Lilopristone	Pimozide	Terazosin	
Clobazam	Estradiol	Loperamide	Pioglitazone	Terfenadine	
Clomipramine	Eszopiclone	Lopinavir	Pravastatin	Testosterone	
Clonazepam	Ethinyl estradiol	Loratadine	Praziquantel	Theophylline	
Clopidogrel	Ethosuximide	Losartan	Prednisolone	Tiagabine	
Clozapine	Ethylmorphine	Lovastatin	Prednisone	Timolol	

**Inhibitors**

<b>1A2</b>		<b>2C9</b>		<b>2C19</b>
Acyclovir	Ritonavir	Amiodarone	Sulfaphenazole	Amitriptyline
Amiodarone	Ropinirole	Anastrozole	Sulfapyrazone	Artemisinin
Amitriptyline	Sparfloxacin	Atazanavir	Sulfonamides	Chloramphenicol
Anastrozole	St. John's Wort	Benzbromarone	Tacrine	Cimetidine
Atazanavir	Tacrine	Capecitabine	Tamoxifen	Citalopram
Caffeine	Tegaserod	Chloramphenicol	Teniposide	Cocaine
Cimetidine	Ticlopidine	Cimetidine	Ticlopidine	Delavirdine
Ciprofloxacin	Tocainide	Clopidogrel	Tipranavir	Devil's Claw
Citalopram	Troleandomycin	Cocaine	Trimethoprim	Efavirenz
Clarithromycin	Verapamil	Cotrimoxazole	Troglitazone	Esomeprazole
Diltiazem	Zafirlukast	Delavirdine	Troleandomycin	Felbamate
Duloxetine	Zileuton	Devil's claw	Valproic acid	Fluconazole
Echinacea		Diclofenac	Voriconazole	Fluoxetine
Enoxacin		Disulfiram	Wolfberry	Fluvastatin
Erythromycin		Efavirenz	Zafirlukast	Fluvoxamine
Estradiol		Fenofibrate	Zileuton	Garlic
Ethinyl estradiol		Fluconazole		Imipramine
Famotidine		Fluorouracil		Indomethacin
Fluoxetine		Fluoxetine		Interferon
Fluphenazine		Flurbiprofen		Isoniazid
Flutamide		Fluvastatin		Ketoconazole
Fluvoxamine		Fluvoxamine		Lansoprazole
Furafylline		Garlic		Letrozole
Gatifloxacin		Gemfibrozil		Modafinil
Grapefruit (juice)		Grapefruit (juice)		Norfluoxetine
Imipramine		Imatinib		Omeprazole
Interferon		Isoniazid		Oral contraceptives
Isoniazid		Itraconazole		Oxcarbazepine
Ketoconazole		Ketoconazole		Pantoprazole
Levofloxacin		Ketoprofen		Paroxetine
Levonorgestrel		Leflunomide		Pirfenidone
Lidocaine		Lovastatin		Probenicid
Lomefloxacin		Methoxsalen		Rabeprazole
Methoxsalen		Metronidazole		Ranitidine
Mexiletine		Mexiletine		Ritonavir
Mibefradil		Modafinil		Sertraline
Moclobemide		Nalidixic acid		St. John's Wort
Moxifloxacin		Norethindrone		Sulfaphenazole
Nalidixic acid		Norfloxacin		Telmisartan
Nelfinavir		Omeprazole		Ticlopidine
Norethindrone		Oral contraceptives		Tolbutamide
Norfloxacin		Paroxetine		Topiramate
Ofloxacin		Phenylbutazone		Tranylcypromine
Omeprazole		Pirfenidone		Troglitazone
Oral contraceptives		Probenicid		Valdecobix
Paroxetine		Ranitidine		Voriconazole
Perphenazine		Ritonavir		
Phenacetin		Rosuvastatin		
Pirfenidone		Sertraline		
Propafenone		St. John's Wort		
Ranitidine		Stiripentol		
Rifampin		Sulfamethoxazole		

**Inhibitors****2D6**

Amiodarone  
 Amitriptyline  
 Anti-histamine  
 Aripiprazole  
 Black cohosh  
 Black pepper  
 Bupropion  
 Cajuput  
 Celecoxib  
 Chloroquine  
 Chlorpheniramine  
 Chlorpromazine  
 Cimetidine  
 Cinalcacet  
 Cinnamon  
 Citalopram  
 Clemastine  
 Clomipramine  
 Clove  
 Clozapine  
 Cocaine  
 Darifenacin  
 Desipramine  
 Diphenhydramine  
 Doxepin  
 Doxorubicin  
 Duloxetine  
 Escitalopram  
 Febuxostat  
 Fluoxetine  
 Fluphenazine  
 Fluvoxamine  
 Ginger  
 Ginseng  
 Goldenseal  
 Halofantrine  
 Haloperidol  
 Hydroxychloroquine  
 Hydroxyzine  
 Imatinib  
 Imipramine  
 Indinavir  
 Lansoprazole  
 Levomepromazine  
 Lomustine  
 Lopinavir  
 Methadone  
 Methotrimeprazine  
 Methylphenidate  
 Metoclopramide  
 Mibefradil  
 Midodrine

**3A4-5**

Acitretin  
 Amiodarone  
 Amprenavir  
 Anastrozole  
 Androstenedione  
 Aprepitant  
 Atazanvir  
 Black cohosh  
 Bromocriptine  
 Cat's claw  
 Chloramphenicol  
 Chloroquine  
 Cimetidine  
 Ciprofloxacin  
 Cisapride  
 Clarithromycin  
 Clomipramine  
 Clotrimazole  
 Cyclosporine  
 Dalfopristin  
 Danazol  
 Delavirdine  
 Devil's claw  
 Diltiazem  
 Dithiocarbamate  
 Doxycycline  
 Echinacea  
 Efavirenz  
 Enoxacin  
 Erythromycin  
 Ethinyl estradiol  
 Ezetimibe  
 Fluconazole  
 Fluoxetine  
 Fluvoxamine  
 Garlic  
 Gestodene  
 Ginseng  
 Goldenseal  
 Grapefruit (juice)  
 Haloperidol  
 Imatinib  
 Indinavir  
 Isoniazid  
 Itraconazole  
 Ketoconazole  
 Khella  
 Lopinavir  
 Methadone  
 Methylprednisolone  
 Methylprednisone  
 Metronidazole

Mibefradil  
 Miconazole  
 Mifepristone  
 Nafamidon  
 Nefazodone  
 Nelfinavir  
 Nevirapine  
 Nicardipine  
 Nifedipine  
 Norethindrone  
 Norfloxacin  
 Norfluoetine  
 Omeprazole  
 Oral contraceptives  
 Oxiconazole  
 Paroxetine  
 Phenobarbital  
 Pimozide  
 Pirfenidone  
 Posaconazole  
 Prednisone  
 Primaquine  
 Propofol  
 Propoxyphene  
 Quinidine  
 Quinine  
 Quinupristin  
 Ranitidine  
 Ranolazine  
 Ritonavir  
 Roxithromycin  
 Saquinavir  
 Sertindole  
 Sertraline  
 Sparfloxacin  
 St. John's Wort  
 Star fruit  
 Tacrolimus  
 Tamoxifen  
 Telithromycin  
 Troglitazone  
 Troleandomycin  
 Valproic acid  
 Venlafaxine  
 Verapamil  
 Voriconazole  
 Zafirlukast  
 Zileuton

**Inducers**

<b>1A2</b>	<b>2C9</b>	<b>2C19</b>	<b>2D6</b>	<b>3A4-5</b>
beta-Naphthoflavone	Aprepitant	Artemisinin	Dexamethasone	Aminoglutethimide
Barbituates	Barbituates	Barbiturates	Rifampin	Amprenavir
Broccoli	Bosentan	Carbamazepine		Aprepitant
Brussel sprouts	Carbamazepine	Ginko Biloba		Barbiturates
Cabbage	Cyclophosphamide	Lopinavir		Bosentan
Caffeine	Ethanol	Norethindrone		Butalbital
Carbamazepine	Ginseng	Orphenadrine		Cannabinoids
Cauliflower	Glipizide	Phenobarbital		Carbamazepine
Charbroiled meats	Ifosfamide	Phenytoin		Cisplatin
Clotrimazole	Pentobarbital	Prednisone		Clotrimazole
Esomeprazole	Phenobarbital	Primidone		Cyclophosphamine
Griseofulvin	Phenytoin	Rifabutin		Dexamethasone
Insulin	Primidone	Rifampin		Efavirenz
Lansoprazole	Rifabutin	Ritonavir		Ethosuximide
Marijuana	Rifampin	St John's Wort		Felbamate
Mebendazole	Rifapentine	Valproic acid		Garlic supplements
Methylcholanthrene	Ritonavir			Ginseng
Modafinil	Secobarbital			Glucocorticoids
Moricizine	St John's Wort			Glutethimide
Nafcillin	Valproic acid			Griseofulvin
Nicotine				Ifosfamide
Omeprazole				Lopinavir
Phenobarbital				Methadone
Phenytoin				Methylprednisolone
Primidone				Modafinil
Psoralen				Nafcillin
Rifampin				Nevirapine
Ritonavir				Oxcarbazepine
St John's Wort				Pentobarbital
Tobacco				Phenobarbital
				Phenylbutazone
				Phenytoin
				Pioglitazone
				Prednisone
				Primidone
				Rifabutin
				Rifampin
				Rifapentine
				Ritonavir
				St. John's Wort
				Sulfinpyrazone
				Topiramate
				Troglitazone
				Troleandomycin



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