

Cytochrome P450 Drug Interaction Table

This table is designed as a hypothesis testing, teaching and reference tool for physicians and researchers interested in drug interactions that are the result of competition for, or effects on the human cytochrome P450 system.

The table contains lists of drugs in columns under the designation of specific cytochrome P450 isoforms. A drug appears in a column if there is published evidence that it is metabolized, at least in part, via that isoform. It does not necessarily follow that the isoform is the principal metabolic pathway *in vivo*, or that alterations in the rate of the metabolic reaction catalyzed by that isoform will have large effects on the pharmacokinetics of the drug.

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This list is maintained by David A. Flockhart, MD, PhD, in the Division of Clinical Pharmacology at the Indiana University School of Medicine (dflockha@iupui.edu). Suggested additions, deletions and references are most welcome; the list has benefited immensely from the input of practicing physicians and other researchers in the field. This page will be updated as new information becomes available.

SUBSTRATES

<u>1A2</u>	<u>2B6</u>	<u>2C19</u>	<u>2C9</u>	<u>2D6</u>	<u>2E1</u>	<u>3A4,5,7</u>
amitriptyline caffeine clomipramine clozapine cyclobenzaprine (Flexeril®) estradiol fluvoxamine haloperidol imipramine N-DeMe mexiletine naproxen ondansetron phenacetin=> acetaminophen =>NAPQI propranolol riluzole ropivacaine tacrine theophylline verapamil (R)warfarin zileuton	bupropion cyclophosphamide ifosfamide	Proton Pump Inhibitors: lansoprazole omeprazole pantoprazole E-3810	NSAIDs: diclofenac ibuprofen meloxicam S- naproxen=>Nor piroxicam suprofen	Beta Blockers: carvedilol S-metoprolol propafenone timolol	Anesthetics: enflurane halothane isoflurane methoxyflurane sevoflurane	Macrolide antibiotics: clarithromycin erythromycin (not 3A5) NOT azithromycin
		Anti-epileptics: diazepam=>Nor phenytoin(O) S-mephenytoin phenobarbitone	Oral Hypoglycemic Agents: tolbutamide glipizide	Antidepressants: amitriptyline clomipramine desipramine imipramine paroxetine	acetaminophen =>NAPQI aniline benzene chlorzoxazone ethanol N,N-dimethyl formamide theophylline =>8-OH	Anti-arrhythmics: quinidine=>3-OH (not 3A5)
		amitriptyline citalopram clomipramine cyclophosphamide hexobarbital imipramine N-DeMe indomethacin R-mephobarbital moclobemide nelfinavir nilutamide	Angiotensin II Blockers: losartan irbesartan	Antipsychotics: haloperidol perphenazine risperidone=>9OH thioridazine		Benzodiazepines: alprazolam diazepam=>3OH midazolam triazolam
			amitriptyline celecoxib fluoxetine fluvastatin glyburide	alprenolol amphetamine bufuralol chlorpheniramine chlorpromazine codeine (=>O-desMe)		Immune Modulators: cyclosporine tacrolimus (FK506)
						HIV Antivirals:

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zolmitriptan		primidone progesterone proguanil propranolol teniposide R-warfarin=>8-OH	phenytoin=>4-OH rosiglitazone tamoxifen torsemide S-warfarin	debrisoquine dexfenfluramine dextromethorphan encainide flecainide fluoxetine fluvoxamine lidocaine metoclopramide methoxyamphetamine mexiletine nortriptyline minaprine ondansetron perhexiline phenacetin phenformin propranolol (=>4OH) quinoxan sparteine tamoxifen tramadol venlafaxine		indinavir nelfinavir ritonavir saquinavir <hr/> Prokinetic: cisapride <hr/> Antihistamines: astemizole chlorpheniramine terfenidine <hr/> Calcium Channel Blockers: amlodipine diltiazem felodipine lercanidipine nifedipine nisoldipine nitrendipine verapamil <hr/> HMG CoA Reductase Inhibitors: atorvastatin cerivastatin

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						<u>lovastatin</u> <u>NOT pravastatin</u> <u>simvastatin</u>
						Steroid 6beta-OH: <u>estradiol</u> <u>hydrocortisone</u> <u>progesterone</u> <u>testosterone</u>
						Miscellaneous: <u>alfentanyl</u> <u>bupirone</u> <u>caffeine=>TMU</u> <u>cocaine</u> <u>dapsone=>N-OH</u> <u>codeine- N-demethylation</u> <u>dextromethorphan</u> <u>fentanyl</u> <u>finasteride</u> <u>haloperidol</u> <u>irinotecan</u> <u>LAAM</u> <u>lidocaine</u> <u>methadone</u> <u>odanestron</u> <u>pimozide</u>

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						<u>propranolol</u> <u>quinine</u> <u>salmeterol</u> <u>sildenafil</u> <u>tamoxifen</u> <u>taxol</u> <u>terfenadine</u> <u>trazodone</u> <u>vincristine</u> <u>zaleplon</u> <u>zolpidem</u>

INHIBITORS(Ki)

<u>1A2</u>	<u>2B6</u>	<u>2C19</u>	<u>2C9</u>	<u>2D6</u>	<u>2E1</u>	<u>3A4,5,7</u>
<u>amiodarone</u> <u>cimetidine</u> <u>fluoroquinolones</u> <u>fluvoxamine</u> <u>furafylline</u> <u>interferon?</u> <u>methoxsalen</u> <u>mibefradil</u> <u>ticlopidine</u>	<u>thiotepa</u>	<u>cimetidine</u> <u>felbamate</u> <u>fluoxetine</u> <u>fluvoxamine</u> <u>indomethacin</u> <u>ketoconazole</u> <u>lansoprazole</u> <u>modafinil</u> <u>omeprazole</u> <u>paroxetine</u> <u>probenicid</u> <u>ticlopidine</u> <u>topiramate</u>	<u>amiodarone</u> <u>fluconazole</u> <u>fluvastatin</u> <u>fluvoxamine</u> <u>isoniazid</u> <u>lovastatin</u> <u>paroxetine</u> <u>phenylbutazone</u> <u>probenicid</u> <u>sertraline</u> <u>sulfamethoxazole</u> <u>sulfaphenazole</u> <u>teniposide</u> <u>trimethoprim</u>	<u>amiodarone</u> <u>celecoxib</u> <u>chlorpromazine</u> <u>chlorpheniramine</u> <u>cimetidine</u> <u>clomipramine</u> <u>cocaine</u> <u>doxorubicin</u> <u>fluoxetine</u> <u>halofantrine</u> <u>red-haloperidol</u> <u>levomepromazine</u> <u>metoclopramide</u> <u>methadone</u>	<u>diethyl-</u> <u>dithiocarbamate</u> <u>disulfiram</u>	HIV Antivirals: <u>delaviridine</u> <u>indinavir</u> <u>nelfinavir</u> <u>ritonavir</u> <u>saquinavir</u> <hr/> <u>amiodarone</u> NOT <u>azithromycin</u> <u>cimetidine</u> <u>ciprofloxacin</u> <u>clarithromycin</u> <u>diethyl-</u>

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			zafirlukast	mibefradil moclobemide paroxetine quinidine ranitidine ritonavir sertraline terbinafine		dithiocarbamate diltiazem erythromycin fluconazole fluvoxamine gestodene grapefruit juice itraconazole ketoconazole mifepristone nefazodone norfloxacin norfluoxetine mibefradil troleandomycin

INDUCERS

<u>1A2</u>	<u>2B6</u>	<u>2C19</u>	<u>2C9</u>	<u>2D6</u>	<u>2E1</u>	<u>3A,4,5,7</u>
roccoli brussel sprouts char-grilled meat insulin methyl cholanthrene modafinil nafcillin? beta-	phenobarbital <PHENYTOIN< a> rifampin	carbamazepine norethindrone NOT pentobarbital prednisone rifampin	rifampin secobarbital	dexamethasone rifampin?	ethanol isoniazid	HIV Antivirals: rifabutin efavirenz nevirapine <hr/> barbiturates carbamazepine glucocorticoids modafinil phenobarbital

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<u>naphthoflavone</u> <u>omeprazole</u> <u>tobacco</u>						<u>phenytoin</u> <u>pioglitazone</u> <u>rifampin</u> <u>St. John's wort</u> <u>troglitazone</u>
GENETICS						
<u>1A2</u>	<u>2B6</u>	<u>2C19</u>	<u>2C9</u>	<u>2D6</u>	<u>2E1</u>	<u>3A4,5,7</u>
Chromosome 15	Chromosome 19	Chromosome 10	Chromosome 10	Chromosome 22	Chromosome 10	Chromosome 7
N/A	Polymorphic	Polymorphic	Polymorphic	Polymorphic	N/A	N/A
N/A	3-4% Caucasians PMs	3-5% Caucasian PMs , 15-20% Asian PMs	1-3% Caucasian PMs	5-10% Caucasian PMs	N/A	N/A