Table 4. Potential herb-drug interactions with drugs metabolized by CYP1 and CYP2 enzymes.

Protein CYP enzyme	Common drug substrates for CYP enzyme	Interactive effect	Herb-causing effect	Reference
CYP1A2	Clozapine Cyclobenzaprine Imipramine Mexiletine Naproxen Riluzole Tacrine Theophylline	Induction	Green & black/fermented tea (*Camellia sinensis*)	[74,75]
		Inhibition	*Ginkgo biloba*	[65,74,75]
			Scutellaria baicalensis	[54,65,74,75]
			Camomile (*Matricaria recutita*)	[74,75]
			Dandelion (*Taraxacum officinale*)	[74,75]
			Echinacea (*Echinacea purpurea*)	[74,75]
			Frankincense (*Boswellia carterii*)	[65,74,75]
			Grapefruit (*Citrus paradisi*)	[61,74-76]
			Kava (*Piper methysticum*)	[74,75]
			Pepper (*Piper nigrum*)	[61,65,74,75]
			Peppermint (*Mentha piperata*)	[74,75]
			St John's wort (*Hypericum perforatum*)	[61,74-77]
CYP2B6	Bupropion Cyclophosphamide Efavirenz Ifosfamide Methadone	Inhibition	*Scutellaria baicalensis*	[54,65,74,75]
CYP2C8	Amodiaquine Cerivastatin Paclitaxel Repaglinide Torsemide	Inhibition	*Angelica dahurica*	[65,74,75]
			Frankincense (*Boswellia carterii*)	[74,75]
			Grapefruit (*Citrus paradisi*)	[74-76]
CYP2C9	Celecoxib Diclofenac Fluvastatin Glipizide Ibuprofen Irbesartan Losartan Naproxen Phenytoin Piroxicam Rosiglitazone Sulfamethoxazole Tamoxifen Tolbutamide Torsemide Warfarin	Inhibition	*Angelica dahurica*	[65,74,75]
			Ginkgo biloba	[65,74,75]
			Scutellaria baicalensis	[54,65,74,75]
			Camomile (*Matricaria recutita*)	[74,75]
			Frankincense (*Boswellia carterii*)	[65,74,75]
			Goldenseal (*Hydrastis canadensis*)	[74,75]
			Grapefruit (*Citrus paradisi*)	[74-76]
			Green & black/fermented tea (*Camellia sinensis*)	[74,75]
			Kava (*Piper methysticum*)	[74,75]
			Papaya (*Carica papaya*)	[34,74,77]
			Saw-palmetto (*Serenoa repens*)	[74,75]
			Siberian ginseng (*Eleutheroccus senticosus*)	[74,75]
			St John's wort (*Hypericum perforatum*)	[61,74-76]
CYP2C19	Amitriptyline Clomipramine Clopidogrel Cyclophosphamide Diazepam Lansoprazole Omeprazole Pantoprazole Phenobarbitone Phenytoin Progesterone Rabeprazole	Inhibition	*Angelica dahurica*	
			Ginkgo biloba	[65,74,75]
			Scutellaria baicalensis	[51,65,74,75]
			Camomile (*Matricaria recutita*)	[54,65,74,75]
			Echinacea (*Echinacea purpurea*)	[74,75]
			Frankincense (*Boswellia carterii*)	[74,75]
			Garlic (*Allium sativum*)	[74,75]
			Goldenseal (*Hydrastis canadensis*)	[74,75]
			Grapefruit (*Citrus paradisi*)	[74,76]
			Green & black/fermented tea (*Camellia sinensis*)	[74,75]
			Kava (*Piper methysticum*)	[74,75]
			Siberian ginseng (*Eleutheroccus senticosus*)	[74,75]
			St John's wort (*Hypericum perforatum*)	[61,74-76]
			Valerian root (*Valeriana officinalis*)	[74,75]

Table 4. Potential herb-drug interactions with drugs metabolized by CYP1 and CYP2 enzymes. ***(Continued)***

Protein CYP enzyme	Common drug substrates for CYP enzyme	Interactive effect	Herb-causing effect	Reference
CYP2D6	Amitriptyline Aripiprazole Clomipramine Codeine Desipramine Dextromethorphan Duloxetine Flecainide Haloperidol Imipramine Mexilletine Ondansetron Paroxetine Propafenone Risperidone S-metoprolol Tamoxifen Thioridazine Timolol Tramadol Venlafaxine	Inhibition	*Ginkgo biloba*	[51,65,74,75]
			Scutellaria baicalensis	[54,65,74,75]
			Black cohosh (*Cimicifuga racemosa*)	[65,74,75]
			Echinacea (*Echinacea purpurea*)	[74,75]
			Frankincense (*Boswellia carterii*)	[74,75]
			Goldenseal (*Hydrastis canadensis*)	[74,75]
			Green & black/fermented tea (*Camellia sinensis*)	[74,75]
			Siberian ginseng (*Eleutheroccus senticosus*)	[74,75]
			St John's wort (*Hypericum perforatum*)	[61,74-76]
CYP2E1	Acetaminophen Aniline Benzene Chlorzoxazone Enflurane Ethanol Halothane Isoflurane Methoxyflurane *N,N*-dimethyl-formamide Sevoflurane Theophylline	Inhibition	Garlic (*Allium sativum*)	[74,75]

CYP Cytochrome P450

Table 5. Potential herb-drug interactions with drugs metabolized by CYP3 enzymes and/or transported by MDR1.

Protein CYP enzyme	Common drug substrates for CYP enzyme	Interactive effect	Herb-causing effect	Reference
CYP3A4	Amlodipine Aripiprazole Astemizole Atorvastatin Buspirone Chlorpheniramine Cisapride Diazepam Diltiazem Erythromycin Felodipine Gleevec Haloperidol Indinavir Lovastatin Methadone Midazolam Nifedipine	Induction	Guggul (*Commiphora mukul*)	[74,75]
			St John's wort (*Hypericum perforatum*)	[61,74-76]
		Induction (hepatic); inhibition (enteric)	Echinacea (*Echinacea purpurea*)	[74,75]
		Inhibition (enteric)	Bitter orange (*Citrus aurantia*)	[51,65,74,75]
			Grapefruit (*Citrus paradisi*)	[74-76]
		Inhibition	*Angelica dahurica*	[65,74,75]
			Ginkgo biloba	[51,65,74,75]
			Scutellaria baicalensis	[54,65,74,75]
			Asian Ginseng (*Panax ginseng*)	[51,74,75]
			Camomile (*Matricaria recutita*)	[74,75]
			Frankincense (*Boswellia carterii*)	[74,75]
			Goldenseal (*Hydrastis canadensis*)	[74,75]
			Green & black/fermented tea (*Camellia sinensis*)	[74,75]
			Kava (*Piper methysticum*)	[74,75]

Table 5. Potential herb-drug interactions with drugs metabolized by CYP3 enzymes and/or transported by MDR1. *(Continued)*

Protein CYP enzyme	Common drug substrates for CYP enzyme	Interactive effect	Herb-causing effect	Reference
CYP3A4 *(continued)*	Nisoldipine Nitrendipine Pimozide Quinidine Quinine Ritonavir Saquinavir Sildenafil Simvastatin Tacrolimus Tamoxifen Telithromycin Trazodone Triazolam Verapamil Vincristine		Licorice (*Glycyrrhiza glabra*)	[51,65,74,75]
			Milk thistle (*Sylibum marianum*)	[74,75]
			Pepper (*Piper nigrum*)	[61,65,74,75]
			Pomelo (*Citrus grandis*)	[51,65,74,75]
			Soya Crop	[51,65,75]
CYP3A5	Alprazolam Amlodipine Aripiprazole Astemizole Atorvastatin Buspirone Chlorpheniramine Cisapride Clarithromycin Cyclosporine Diazepam Diltiazem Felodipine Gleevec Haloperidol Indinavir Lovastatin Methadone Midazolam Nifedipine Nisoldipine Nitrendipine Pimozide Quinine Ritonavir Saquinavir Sildenafil Simvastatin Tacrolimus Tamoxifen Telithromycin Trazodone Triazolam Verapamil Vincristine	Induction (hepatic); inhibition (enteric)	Echinacea (*Echinacea purpurea*)	[74,75]
		Inhibition (enteric)	Grapefruit (*Citrus paradisi*)	[74-76]
		Inhibition	*Angelica dahurica*	[65,74,75]
			Garlic (*Allium sativum*)	[74,75]
CYP3A7	Alprazolam Amlodipine Aripiprazole Astemizole Atorvastatin Buspirone Chlorpheniramine Cisapride Clarithromycin Cyclosporine Diazepam Diltiazem Erythromycin	Induction (hepatic); inhibition (enteric)	Echinacea (*Echinacea purpurea*)	[74,75]
		Inhibition	*Angelica dahurica*	[65,74,75]
			Garlic (*Allium sativum*)	[74,75]

Table 5. Potential herb-drug interactions with drugs metabolized by CYP3 enzymes and/or transported by MDR1. *(Continued)*

Protein CYP enzyme	Common drug substrates for CYP enzyme	Interactive effect	Herb-causing effect	Reference
CYP3A7 *(continued)*	Felodipine Gleevec Haloperidol Indinavir Lovastatin Methadone Midazolam Nifedipine Nisoldipine Nitrendipine Pimozide Quinidine Quinine Ritonavir Saquinavir Sildenafil Simvastatin Tacrolimus Tamoxifen Telithromycin Trazodone Triazolam Verapamil Vincristine			
Protein transporter	**Common drug substrates for ABCB1**	**Interactive effect**	**Herb-causing effect**	**Reference**
ABCB1 (MDR1, Pgp)	Acetaminophen Cyclosporine Digoxin Efavirenz Erythromycin Fexofenadine Imatinib Indinavir Irinotecan Lansoprazole Midazolam Nevirapine Nifedipine Nitrendipine Omeprazole Ondansetron Paclitaxel Pantoprazole Phenytoin Risperidone Ritonavir Saquinavir Sertraline Simvastatin Tacrolimus Tamoxifen Verapamil Vincristine Warfarin	Induction	Garlic (*Allium sativum*)	[51,74,75]
			Guggul (*Commiphora mukul*)	[51,74,75]
		Induction (enteric)	St John's wort (*Hypericum perforatum*)	[51,61,74,75]
		Inhibition	Asian Ginseng (*Panax ginseng*)	[51,65,74,75]
			Milk thistle (*Sylibum marianum*)	[51,74,75]
			Pepper (*Piper nigrum*)	[51,61,65,74,75]
			Valerian root (*Valeriana officinalis*)	[51,74,75]
		Modulation	*Ginkgo biloba*	[65,74,75]

The paper “Chan, E., Tam, M., Xin, J., Sudarsanam, S., Johnson, D.E. (2010). Interactions between traditional Chinese medicines and Western Therapeutics. *Current Opinion in Drug Discovery & Development*, *13(1),* 50 – 65” is highly recommended as an introduction to the issues of

simultaneous use. They include other useful information and tables and have a list of some excellent papers for reference.

This paper can be found at:
http://www.genego.com/pdf/Chan__Tan__Xin__Sudarsanam__Johnson_2010.pdf