funny as of course many herb should have benefits to the patient and help them reduce their need for the pharmaceutical. Isn’t that our goal? This is still an interaction and needs to be recorded. This is especially true if the cumulative effect might cause a new or additional health issue.

Most of the possible interactions may be classified into two major categories: pharmacokinetic and pharmacodynamic interactions. We will look at these two areas.

**Pharmacokinetic Interactions**

Pharmacokinetic interaction refers to the fluctuation in bioavailability of herb/nutrient/drug substances in the body as a result of changes in absorption, distribution, metabolism and elimination.

**Absorption**

Absorption is the passage of herbs, nutrients, or drugs from the outside to the inside of the body. The majority of all absorption occurs in the intestines, where herbs or drugs must pass through the intestinal wall to enter the blood. Several mechanisms may interfere with the absorption of drugs through the intestines.

![Image](https://via.placeholder.com/150)

Botanicals may be adversely affected when they are given together with some drugs due to binding in the G.I. tract: for example, *Questran* (cholestyramine), *Colestid* (colestipol), *Carafate* (sucralfate) may bind to certain herbs, forming an insoluble complex, thus decrease absorption because the size of the insoluble complex is too big to pass through the intestinal wall.

Herbs may be adversely affected when the herbs are given together with some drugs that change the pH of the stomach: for example, *Antacids: Tagamet* (cimetidine), *Pepcid* (famotidine), *Axid* (nizatidine), *Zantac* (ranitidine) and *Prilosec* (omeprazole) may neutralize, decrease or inhibit the secretion of stomach acid. With the subsequent decrease of stomach acid, herbs may not be broken down properly, leading to poor
absorption in the intestines. To minimize the risk of interaction, it is best if the drugs and the herbs are taken separately by approximately two hours and/or by taking digestive enzymes with the botanical if indicated.

**Drugs that affect G.I. motility** may affect the absorption of herbs. G.I. motility is the rate at which the intestines contract to push the content from the stomach to the rectum. **Slower G.I.** motility means the herbs stay in the intestines for a longer period of time and there will be an increase in absorption. Conversely, **faster G.I.** motility means the herbs stay in the intestines for a shorter period of time and there may be a decrease in absorption:

**Decreased G.I. motility** may increase absorption of herbs: for example,
- **Haldol** (haloperidol). Therefore, it may be necessary to decrease the dosage of herbs

**Increased G.I. motility** may possibly decrease absorption of herbs: for example,
- **Reglan** (metoclopramide) and **Propulsid** (cisapride);

**Distribution**

After absorption, herbs or drugs need to be presented to the affected area to exert their effect. This refers to the process in which herbs or drugs are carried and released to different parts of the body.

At the present time, most drugs and herbs do not appear to have any clinically significant interactions affecting distribution and can be safely taken together. Interactions occur during the distribution phase if the drug has a narrow range of safety index and are highly protein-bound. For example, **Coumadin** (warfarin) is an anticoagulant medication that is very highly bound to protein and has a very narrow range of safety index. Coumadin (warfarin) interacts with various drugs, vitamins, herbs and foods via different mechanisms.

**Known examples that interact with Coumadin** (warfarin) include aspirin, ibuprofen, vitamin K, some types of tea, green leaf vegetables, etc. These items interact with Coumadin (warfarin) by either enhancing its
effectiveness and thus leading to prolonged bleeding, or by
decreasing its effectiveness and thus increasing the risk of
blood clots in the vessels, both of which may be quite
dangerous to the patient.

This is why patients who are taking Coumadin (warfarin)
need to be exceedingly cautious when taking herbs
concurrently. Unfortunately, it is extremely difficult to
predict whether an individual herb will interact with
Coumadin (warfarin), because there are very few tests or
experiments documenting such interactions. The best
precautionary measure is close observation of the patient's
condition. If the patient shows abnormal signs of bleeding
and bruises, then the dosage of herbs may need to be
adjusted and the patient's medical doctor should be
contacted immediately. Just because a herb is also a
‘blood thinner’ does not mean it will have an interaction.
This is an area that is rich in the ‘thought experiment’
literature, but that has not shown up at the clinical level.
Again, this doesn’t mean that you don’t have to watch, you
do! If there is a potential for an interaction, someone out
there will have it. It also doesn’t mean you can not use that
botanical or nutrient supplement, you just have to be way
more responsible, with a keen eye to observation. It usually
means starting with a lower dosage and slowly increasing
it.

**Metabolism**

Most of the herbs, nutrients and drugs are metabolized by
the liver to their inactive derivatives. The rate at which the
liver metabolizes these determines the length of time they
stay active in the body. If the liver were induced to speed
up its metabolism (excessive), the substance would be
inactivated at a faster pace and the overall effectiveness of
ingested substances would be lower. On the other hand, if
the liver is induced to slow down its metabolism
(deficiency), the herbs and drugs would be inactivated at a
slower pace and the overall effectiveness of the substances
would be higher.

In general, drugs that induce liver metabolism do not exert
an immediate effect. The rate of liver metabolism changes
slowly over several weeks. Therefore, the effect of
increased liver metabolism is not seen until weeks after the initiation of drug therapy.

**Drugs that speed up liver metabolism:**
- Dilantin (phenytoin), Tegretol (carbamazepine), phenobarbitals and rifampin.

Therefore, the herbs may be inactivated faster and their overall effectiveness may be lower. Under such circumstances, the patient may need a higher dose of herbs to achieve the desired effectiveness.

**Drugs which inhibit liver metabolism** have an immediate onset of action. The rate of liver metabolism may be greatly impaired within a few days. Therefore, there is a higher risk of herbs accumulating inside the body as the function of the liver to inactivate them is compromised.

**Drugs that slow down or inhibit liver metabolism** include, but are not limited to:
- Tagamet (cimetidine), erythromycin, ethanol,
- Diflucan (fluconazole), SporonoX (itraconazole) and Nizoral (ketoconazole).

Therefore, the herbs may be inactivated more slowly and the overall effectiveness may be prolonged. In this case, one may need to lower the dosage of herbs to avoid unwanted side-effects.

**Elimination**

The liver and the kidney are responsible for eliminating herbs and drugs from the body. If the kidney(s) are damaged, the rate of elimination by the kidneys would be slowed down, leading to an accumulation of herbs and drugs in the body.

**Drugs that damage the kidneys** include:
- amphotericin B, methotrexate, tobramycin and gentamicin.

As a safety precaution, it may be necessary to lower the dosage of herbs if warranted to avoid unnecessary and unwanted side effects.
### Table 1. Recognition of Drugs of Higher Risk of Interaction

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Generic Name</th>
<th>Type of Drugs</th>
<th>Effect of Interaction</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rifadin</td>
<td>rifampin</td>
<td>anti-biotic</td>
<td>may reduce elimination of herbs</td>
<td>decrease dose of herbs if necessary</td>
</tr>
<tr>
<td>Reglan</td>
<td>metoclopramide</td>
<td>GI stimulant</td>
<td>may interfere with absorption of herbs</td>
<td>separate taking herbs &amp; drugs by two hours</td>
</tr>
<tr>
<td>Propulsid</td>
<td>cisapride</td>
<td>GI stimulant</td>
<td>may interfere with absorption of herbs</td>
<td>increase dose of herbs if necessary</td>
</tr>
<tr>
<td>Questran</td>
<td>cholestyramine</td>
<td>Anti-hyperlipidemic</td>
<td>may decrease absorption of herbs</td>
<td>separate taking herbs &amp; drugs by two hours</td>
</tr>
<tr>
<td>Pepto</td>
<td>pepcid</td>
<td>anti-fungal</td>
<td>may slow the metabolism of herbs</td>
<td>decrease dose of herbs if necessary</td>
</tr>
<tr>
<td>Dilantin</td>
<td>phenytoin</td>
<td>anti-convulsant</td>
<td>may increase the metabolism of herbs</td>
<td>decrease dose of herbs if necessary</td>
</tr>
<tr>
<td>ESS</td>
<td>erythromycin</td>
<td>anti-biotic</td>
<td>may slow the metabolism of herbs</td>
<td>decrease dose of herbs if necessary</td>
</tr>
<tr>
<td>E-Mycin</td>
<td>erythromycin</td>
<td>anti-biotic</td>
<td>may slow the metabolism of herbs</td>
<td>decrease dose of herbs if necessary</td>
</tr>
<tr>
<td>Eryc</td>
<td>erythromycin</td>
<td>anti-biotic</td>
<td>may slow the metabolism of herbs</td>
<td>decrease dose of herbs if necessary</td>
</tr>
<tr>
<td>Ethanol</td>
<td>alcohol</td>
<td>anti-fungal</td>
<td>may slow the metabolism of herbs</td>
<td>decrease dose of herbs if necessary</td>
</tr>
<tr>
<td>Halodol</td>
<td>haloperidol</td>
<td>Antipsychotic</td>
<td>may interfere with absorption of herbs</td>
<td>decrease dose of herbs if necessary</td>
</tr>
<tr>
<td>Maalax</td>
<td>antacid</td>
<td>Antacid</td>
<td>may interfere with absorption of herbs</td>
<td>separate taking herbs &amp; drugs by two hours</td>
</tr>
<tr>
<td>Methotrexate</td>
<td>methotrexate</td>
<td>anti-neoplastic</td>
<td>may reduce elimination of herbs</td>
<td>decrease dose of herbs if necessary</td>
</tr>
<tr>
<td>Mylanta</td>
<td>antacid</td>
<td>Antacid</td>
<td>may interfere with absorption of herbs</td>
<td>separate taking herbs &amp; drugs by two hours</td>
</tr>
<tr>
<td>Nizoral</td>
<td>ketoconazole</td>
<td>anti-fungal</td>
<td>may slow the metabolism of herbs</td>
<td>decrease dose of herbs if necessary</td>
</tr>
<tr>
<td>Pepeid</td>
<td>famotidine</td>
<td>acid-reducer</td>
<td>may interfere with absorption of herbs</td>
<td>adjust herb doses according to the patient</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>phenobarbital</td>
<td>anti-convulsant</td>
<td>may increase the metabolism of herbs</td>
<td>increase dose of herbs if necessary</td>
</tr>
<tr>
<td>Prilosec</td>
<td>omeprazole</td>
<td>acid-reducer</td>
<td>may interfere with absorption of herbs</td>
<td>adjust herb doses according to the patient</td>
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<tr>
<td>Rifadin</td>
<td>rifampin</td>
<td>anti-biotic</td>
<td>may increase the metabolism of herbs</td>
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</tbody>
</table>
Herb-Drug-Nutrient Interaction
By Terry Willard CIH, PhD

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Herb-Drug-Nutrient Interaction

Summary of Pharmacokinetic Interactions

The pharmacokinetic interactions listed in this section include both theoretical and actual interactions. Though such interactions are possible, the extent and severity of each interaction will vary depending on the specific circumstances, such as dosage, sensitivity, body weight and metabolic rate.

Pharmacodynamic Interactions

Pharmacodynamic refers to the study of how drugs actually behave inside the human body. Pharmacodynamic interactions refer to the fluctuation in bioavailability of ingested substances as a result of synergistic or antagonistic interactions between herb/drug substances. These interactions are generally more difficult to predict and prevent than pharmacokinetic interactions. Most of the pharmacodynamic interactions known now are documented through actual cases—as opposed to laboratory experiments.

The best way to prevent pharmacodynamic interactions is to follow the patient closely and monitor all clinical responses including signs, symptoms and any abnormal reactions. Examples of pharmacodynamic interaction include additive or antagonistic interactions. An additive effect occurs when two drugs of similar properties show additive or exponential increase in clinical effects when given together. An antagonistic effect occurs when two drugs of similar properties show lessened or no clinical effect when given together.

Herb-to-Drug Interactions

The pharmacodynamics of herb-nutrient-drug interactions are best identified by analyzing the therapeutic effect of the

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</tr>
</thead>
<tbody>
<tr>
<td>Sporono</td>
<td>itraconazole</td>
<td>anti-fungal</td>
<td>may slow the metabolism of herbs</td>
<td>decrease dose of herbs if</td>
</tr>
<tr>
<td>Tagamet</td>
<td>cimetidine</td>
<td>acid-reducer</td>
<td>may interfere with absorption of herbs</td>
<td>adjust herb doses according to</td>
</tr>
<tr>
<td>Tagamet</td>
<td>cimetidine</td>
<td>acid-reducer</td>
<td>may slow the metabolism of herbs</td>
<td>decrease dose of herbs if</td>
</tr>
<tr>
<td>Tegretol</td>
<td>carbamazepine</td>
<td>anti-convulsant</td>
<td>may increase the metabolism of herbs</td>
<td>increase dose of herbs if</td>
</tr>
<tr>
<td>Tums</td>
<td>antacid</td>
<td>Antacid</td>
<td>may interfere with absorption of herbs</td>
<td>separate taking herbs &amp; drugs</td>
</tr>
<tr>
<td>Zantac</td>
<td>ranitidine</td>
<td>acid-reducer</td>
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</tbody>
</table>

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herbs and drugs. Concurrent use of herbs and drugs with similar therapeutic actions could risk a herb-to-drug interactions, but not always. The increase in treatment effect interferes with optimal treatment outcome as the desired effect becomes more unpredictable and harder to obtain with precision.

The highest risk of clinically significant interactions occurs between herbs, nutrients, or drugs that have sympathomimetic effects, cardiovascular effects, diuretic effects, anticoagulant effects and anti-diabetic effects.

Herbs with sympathomimetic effects may interfere with anti-hypertensive and antiseizure drugs. The classic example of an herb with sympathomimetic effects is Ma Huang (Ephedra), which contains ephedrine, pseudoephedrine, norephedrine and other ephedrine alkaloids. Ma Huang may interact with many other drugs and disease conditions and should always be used with caution in patients who have hypertension, seizures, diabetes, thyroid conditions, etc.

Concomitant use of diuretic herbs and diuretic drugs may have additive or synergistic effects, making hypertension more difficult to control or hypotensive episodes more likely. The dosage of herbs and/or drugs must be adjusted to achieve optimal treatment outcome.

Herbs with anticoagulant effects include herbs that have blood-activating and blood-stasis-removing functions. Such herbs may interfere with anticoagulant drugs, such as Coumadin (warfarin), to prolong the bleeding time. Herbs that interfere with Coumadin (warfarin) include Salviae Miltiorrhizae (Dan Shen), Angelica Sinensis (Dang Gui), Ligustici Chuanxiong (Chuan Xiong), Persicae (Tao Ren), Carthamus Tinctorii (Hong Hua) and Hirudo seu Whitmania (Shui Zhi). The synergistic interaction between herbs and Coumadin (warfarin) may be advantageous for the patient as the dosage of both the herbs and the drugs can be reduced without compromising clinical effectiveness. The reduction in dosage will also decrease the frequency and severity of side effects of the drugs.
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Optimal treatment, however, is directly dependent on careful titration of the herb and drug, cooperation from the patient, and communication between the doctors who prescribe the herbs and the drugs.

**Anti-diabetic** herbs may interfere with anti-diabetic drugs by enhancing hypoglycemic effects. The dosage of herbs and drugs must be balanced carefully to control effectively the blood glucose level without causing hyper- or hypoglycemia. Herbs with definite hypoglycemic effects include the following pairs of herbs: Anemarrhena Asphodeloidis (Zhi Mu) and Gypsum Fibrosum (Shi Gao); Scrophularia Ningpoensis (Xuan Shen) and Atractylodes (Cang Zhu); and Dioscorea Opposita (Shan Yao) and Astragalus Membranacei (Huang Qi).

**Teratogenic Herbs**

Teratogenic herbs are known to have the tendency or likelihood of causing **danger or harm to the fetus during pregnancy** and thus leading to birth defects or spontaneous abortion. Teratogenic herbs are classified into **two categories**: prohibited and use with caution.

**Prohibited herbs** are very potent and very toxic. The use of these herbs during pregnancy is prohibited to avoid possible harm to the fetus. Prohibited herbs include Semen Crotonis (Ba Dou), Semen Pharbitidis (Qian Niu Zi), Radix Euphorbiae (Da Ji), Mylabris (Ban Mao), Radix Phytolaccae (Shang Lu), Moschus (She Xiang), Rhizoma Sparganii (San Leng), Rhizoma Zedoariae (E Zhu), Hirudo seu Whitmania (Shui Zhi) and Tabanus (Meng Chong).

Herbs that should be **used with caution** are herbs that are pungent and warm in nature and have the functions to activate Qi, activate Blood circulation, and remove blood stasis. They are also very potent in nature and should be avoided during pregnancy whenever possible. The use of these herbs should be limited only to later stages of pregnancy and only when the benefits of using the herbs outweigh the risks.

Herbs that should be used with caution include Semen Persicae (Tao Ren), Flos Carthami (Hong Hua), Rz. et Rx. Rhei (Da Huang), Fructus Aurantii (Zi Shi), Radix Aconiti
(Fu Zhi), Rhizoma Zingiberis (Gan Jiang), and Cortex Cinnamomi (Rou Gui).

**Conclusion**

Historically, herbs and drugs have been two very different treatment modalities, which have rarely, if ever, been used together. The line that separates herbs and drugs, however, has been blurred in recent times with the increased accessibility to the lay public of different treatment modalities. It becomes very difficult to predict whether the combination of all these medications will lead to unwanted side effects and/or interactions. It is imprudent to assume that there will be no interactions.

On the other hand, it is just as **unwise to abandon treatment simply for the fear of possible interactions**. The solution to this situation is in the understanding of drug-drug and drug-herb-nutrient interactions. With understanding of these mechanisms, one can recognize potential interactions and take proper actions to prevent their occurrence.

**Herb Drug Interaction Quick Facts**

- As previously addressed, most herbal-drug interactions are theoretical or are based on suspected pharmacologic activity or in vitro data. Although it is commonly felt that warfarin interacts with several herbals, actual documentation has only been reported for a few herbals.

- Statistics on the simultaneous use of drugs and herbs varies depending on what authority has published their findings. A study in the early nineties found that 18.4%\(^1\) of those surveyed were simultaneously using drugs and herbs. Prevention magazine published a report in 2000\(^2\) stating that 31% prescription drugs and 48% OTC drugs were being simultaneously used with herbal supplements.

- The American Herbal Products Association’s Botanical Safety Handbook reviewed 540 popular herbs in depth