

Herbal remedies: natural therefore safe?

Herbalism is the most plausible of the CAMs so is it a safe alternative to conventional medicine?

By Graham Lappin Ph.D © 2010

It is true that some plants contain pharmacologically active substances and on that basis, perhaps there is some utility in herbal remedies. Closer examination however, reveals that not only are many of the claims of the herbalist very spurious, there are hidden and pernicious dangers.

Of all the Complementary and Alternative Medicines (CAM), from homeopathy to urine therapy, perhaps the one that might have some basis of rationality is herbal medicine. Plants have evolved an array of chemicals (referred to here as phytochemicals) many of which deter attack by insects, pathogens and grazing animals. Animals that feed on the plants and plant pathogens have co-evolved their own biochemical systems that neutralise these phytochemicals and then in their turn, plants evolved further chemical counter-measures and so the engine of evolution is driven.

Not surprisingly therefore, a number of phytochemicals have been shown to have strong pharmacological effects in humans. Indeed some have been developed into conventional medicines, perhaps the best-known example being digoxin, derived from species of *Digitalis* (foxglove), which is used to treat various heart conditions. Whilst CAMs such as homeopathy have no known mechanistic basis on which they can exert any therapeutic effect, herbal medicine on the other hand may just have a foot in reality.

Scratch at the herbalist patina of credibility however and a slightly different story is revealed. The herbalist will claim that particular plants or their extracts will alleviate certain medical conditions. For the most part, herbalism falls at this first rather low hurdle. Take Ginkgo (*Ginkgo biloba*) as an example. Ginkgo is one of the most widely used herbal remedies and it is claimed to treat amongst other things, Alzheimer's, narrowing of the arteries, tinnitus, asthma, bronchitis, fatigue (whatever that really means) and multiple sclerosis. In the real world of science and medicine, claims for efficacy over such a wide range of essentially unrelated diseases rings sufficient alarm bells to drown out Saint Paul's Cathedral. It might be argued that because a plant extract contains a wide range of phytochemicals that there are many active compounds present, providing a therapeutic spectrum towards a range of diseases. If that is true,

then it raises another problem, one of side effects and we will come to that in a moment.

Is there any real evidence that Ginkgo comes up to its promises? I am not claiming to have conducted a comprehensive literature search for this article but Ginkgo has been subjected to decent clinical trials and the results have been pretty much in the negative. For example, no significant effect on [cognitive decline](#) and no significant effect on the treatment on [sub-acute tinnitus](#)

Another widely used herbal remedy is Saint John's Wort (*Hypericum perforatum*). This herb is used primarily for the treatment of depression, typically in its milder forms and some antibiotic effects are claimed. Unlike Ginkgo however, in general use Saint John's Wort is not associated with the treatment of a long list of ailments and there is some, albeit limited, [evidence of efficacy](#)

We are therefore left, at best, in a position where the effectiveness of certain herbal remedies cannot be ruled out but perhaps the magnitude of the effect is in some doubt. There is however, one very significant issue with herbal therapies that the herbalists may not necessarily dwell upon. There is no such thing as a free lunch and where there is pharmacologic action, there are by definition, toxic side effects. The reason why the homeopath can truthfully claim no side effects is simply because there are no effects in the first place from which off-target pharmacology can arise. This is not the case with herbal remedies – far from it. Proponents of CAM often bemoan that conventional drugs exhibit unpleasant or dangerous side effects but conveniently forget that herbal medicine is far from side effect free.

Driven by an evolutionary chemical warfare over eons, plants developed an array of phytochemicals and animals (including humans) developed counter measures to cope with this dietary chemical onslaught. There are a series of enzymes in the body that have evolved precisely to remove and "detoxify" (a word I hate, but it has a descriptive meaning here) a variety of foreign chemicals we encounter everyday. Whether these chemicals are natural or synthetic is a matter of extreme indifference to these detoxification biochemical

pathways and they will act equally upon toxic solanidine ingested from potatoes, as they will paracetamol taken for the headache after reading this article.

There are two types of detoxification enzyme that I want to mention here. There is a very diverse group of enzymes known as the Cytochrome P450's that are generally considered the most important in the elimination of foreign chemicals from the body. Abbreviated to CYP P₄₅₀, they add a single oxygen to a target molecule which in general terms makes the compound more water soluble to facilitate excretion. The individual CYP P₄₅₀s are identified by a numbering system based on the associated genes responsible for the synthesis of the enzyme. For example there is CYP 1A1 which amongst other things will metabolise certain compounds derived from tobacco smoke. The other class of enzymes add large water-soluble molecules such as sugars, certain amino acids and sulphate to foreign compounds, again increasing their water solubility to facilitate excretion. In addition to enzymes, there are also a number of transporter proteins in the body that either actively pump certain compounds into cells (influx pumps) or out the cell (efflux pumps). This all leads to a pretty complex array of biochemistry although scientists have a reasonably good handle on what's going on – but much yet to learn and discover (thus keeping me in a job).

Many phytochemicals have evolved to perturb the biochemistry responsible for their metabolism and elimination from the body, perhaps not surprisingly. Herbal medicines therefore can be masters at messing up your "detoxification" mechanisms. (This is the exact opposite of what many herbalist will claim of course. They will claim that herbal remedies "detoxify the body"). The big problem with many herbal remedies therefore is that they either inhibit or induce the body's ability to handle certain foreign compounds and then when the body is exposed, say to a prescription drug, serious toxic effects result. These are known in the business as herb-drug interactions.

[Ginkgo, for example, has been shown to inhibit the liver's ability to add a sugar known as glucuronide to certain chemicals.](#) This glucuronidation mechanism is important in the elimination of several drugs, including paracetamol. Saint John's Wort is the king of herb-drug interactions. [Saint John's Wort contains numerous pharmacologically active ingredients](#), including naphthodianthrones, phloroglucinol-derivatives and flavonoids. Saint John's Wort contains a compound called hyperforin, widely associated with the induction of the Cytochrome P₄₅₀ enzyme CYP 3A4.

CYP 3A4 is one of the most important enzymes in the metabolism of foreign compounds in the body and by increasing its activity, a number of drugs are eliminated

much faster than usual and hence their effectiveness is significantly reduced. In addition, at least one transporter protein, the efflux pump known as P-glycoprotein, is inhibited by extracts of Saint John's Wort, which can lead to increased absorption of certain compounds. Repeated use of this particular herbal remedy really is the biochemical equivalent of the spanner in the works. For those that might claim herbal remedies are natural and therefore safe, [a number of life-threatening interactions](#) have been reported with Saint John's Wort such as reduced blood concentrations of anti-infectives and anti-cancer drugs. In addition a number of unwanted pregnancies have occurred in women using oral contraceptives. For these reasons, Saint John's Wort has been available in Ireland by prescription only since 2000.

[The list of drugs affected by Saint John's Wort](#) is rather frightening and includes alprazolam, amitriptyline, atorvastatin, chlorzoxazone, ciclosporin, debrisoquine, digoxin, erythromycin, fexofenadine, gliclazide, imatinib, indinavir, irinotecan, ivabradine, mephenytoin, methadone, midazolam, nifedipine, omeprazole, oral contraceptives, quazepam, simvastatin, tacrolimus, talinolol, verapamil, voriconazole and warfarin. And if that were not enough, the active compound in Saint John's Wort, hyperforin, can cause serious reactions in those with fair skin when exposed to sunlight

For completeness there are also many drug-drug interactions known as well. The difference here is that such interactions are studied thoroughly as a drug is developed and so there is some warning that adverse effects might arise. Herbal remedies are however, such a complex mixture and are variable from one source to the next that adverse effects can come at you by stealth. Even more worrying, herbalists rarely have any such knowledge and are largely unregulated. How many herbalists will check what other medication you might be on when buying Saint John's Wort, for example. Moreover, in conventional medicine for anything other than life-saving compounds, if an interaction with CYP 3A4 is discovered, that will pretty much kill any chance of the drug being marketed. If the sale of Saint John's Wort were regulated to the same rules as a conventional pharmaceutical I have no doubt it would be banned and the anti-pharmaceutical brigade would be using it as a prime example of how evil these types of drugs are.

The underlining fallacy of herbal medicine is that feasibility is confused with fact. It's like saying that because there is a likelihood of life existing elsewhere in the Universe, then this is proof of alien abduction. There is some evidence to support that some herbal remedies are efficacious as claimed but the potency generally seems weak and the side effects substantial. To me the claims of herbal medicine can be perniciously misleading.