Treating Hypertension Botanically

Many individuals, worldwide, suffer from elevated blood pressure, which increases their risk of developing numerous serious conditions, including atherosclerosis, myocardial infarction, stroke, and renal failure. There is no single treatment for hypertension because there are many subcategories of hypertension based on etiology and risk factors as well as the unique constitution of the individual. This article deals with the treatment of people suffering from so-called “essential” hypertension. The focus is specifically on reducing blood pressure readings but does not discuss the use of botanicals to address underlying causes of hypertension because the topic is too complex. However, many (but not all) herbs that lower blood pressure readings do so, in part, by addressing causes. There are other herbs that strengthen systems taxed by hypertension, such as the kidneys, that are also not discussed here. This does not mean that underlying causes or stressed tissues cannot or should not be addressed with herbs but that the issue is too large to discuss here.

Hypertension must be defined precisely. A single blood pressure reading can never be used to diagnose chronic hypertension. Instead, at least three readings on different days are required. Ideally, to reduce error, these readings should be conducted by the same person using the same equipment, at the same time of day, and in the same setting. The official criteria defining hypertension in the United States are set by the Joint National Committee (JNC) on Detection, Evaluation and Treatment of High Blood Pressure. The box entitled JNC Criteria for Hypertension shows the official criteria set by this organization in 1993.

Importance of Lifestyle Changes

Essential hypertension largely results from various unhealthy lifestyle habits. These include excessive salt consumption; borderline micronutrient intake (calcium, magnesium, antioxidants, etc.); excessive simple carbohydrate, fat, and calorie intake; and a sedentary lifestyle. These factors lead to glucose intolerance, hyperinsulinemia, atherosclerosis, sodium retention, obesity, and other problems that seem to work together to produce essential hypertension.

Drug therapy is the mainstay for combating essential hypertension in most allopathic settings. This is unfortunate because dietary therapies, exercise, and weight loss are often able to correct the problem without medication. This approach does require a lot of patient motivation and support, because it usually represents a significant change in lifestyle, a difficult (but not impossible) feat for everyone. One highly telling illustration of the power of lifestyle in eliminating hypertension was a study known as Dietary Approaches to Stop Hypertension.¹ This study randomized 459 adults with hypertension to a diet rich in fruits and vegetables but not reduced in fat content; a diet rich in fruits, vegetables, low-fat dairy products, and low total and saturated fat; or no change from their usual diets. The reductions in blood pressure were substantial in the altered-diet groups, particularly the group that was on the low-fat diet. Sodium chloride intake and physical activity were not modified in this trial, which would probably have added even greater benefits.

Every patient with essential hypertension should first be approached in terms of helping him or her to change lifestyles. However, realistically, it will be necessary to take additional measures to lower blood pressure in many cases. If a patient has mild or moderate hypertension that does not respond fully to lifestyle changes, botanical therapies can be of great benefit. Additionally, some people improve partially with lifestyle changes, but still register as having mild hypertension or high-normal blood pressure. In such cases, mild, safe botanical medicines often help to support complete normalization of blood pressure. Prescription medications should be reserved for cases of severe or very severe hypertension and for cases for which lifestyle changes and botanicals fail to bring about a change in blood pressure.

In the Beginning, There Was Snakeroot

One botanical medicine actually helped to launch the pharmacologic treatment of patients with hypertension and has quite a strong physiologic effect. This plant is Rauwolfia serpentina (Indian snakeroot or rauwolfia) of the Apocynaceae family, which grows primarily in southern Asia, particularly in India. Known as sarpa-gandha or chandrika in Sanskrit, this plant has long been used in Ayurvedic medicine as a remedy for such ailments as insanity, snake bite, and dysentery.²

The story of rauwolfia is a classic tale of how a botanical medicine can be preempted by pharmacologic medicine,
A reported association between reserpine and breast cancer in case-control studies reported in 1974 was ultimately proven to be spurious.

turned into a drug, find great utility, then ultimately be maligned and rejected in favor of more expensive but not safer or more effective synthetic drugs. The reality is that rauwolfia is one of the most effective therapeutic options for patients with mild-to-moderate essential hypertension that is not improved by lifestyle changes.

The Latin name _Rauwolfia_ is taken from the sixteenth century German botanist and adventurer Leonhard Rauwolf. Nearly a century after his death, the plant was named after Rauwolf, in recognition of his popular exploits traveling around Asia exploring the use of indigenous plants. Already in wide use in India and possibly already known in Europe and China, rauwolfia would, over time, come into wider and wider use. Rauwolfia was used to treat people with schizophrenia, but the doses involved were high and often led to severe adverse effects.

Apparently the antihypertensive actions of rauwolfia were noted incidentally during European use of this plant. It is not clear entirely clear if rauwolfia was used to treat patients with hypertension in Ayurvedic medicine, because Ayurvedic conceptions of disease differ from those in modern biomolecular medicine and because hypertension was far less common prior to the modern Industrial Revolution.

Rauwolfia contains several alkaloids, particularly reserpine (first isolated in 1952) and ajmaline. Reserpine and other rauwolfia alkaloids bind irreversibly to catecholamine storage granules in neurons, primarily those in the midbrain autonomic centers and cells in the adrenal medulla. These alkaloids then cause a depletion of catecholamines and 5-hydroxytryptamine from those granules. The result is a lessening of systemic

_Hibiscus rosa-sinensis._
Low-dose reserpine is extremely safe as well as far less expensive than any synthetic antihypertensive drugs.

Rauwolfia, Reserpine and Drug Interactions

Reserpine is highly protein bound and may interact with other protein-bound drugs. These include aspirin, most nonsteroidal anti-inflammatory drugs, all HMG [3-hydroxy-3-methylglutaryl] coenzyme A reductase inhibitors except pravastatin, loop diuretics, paroxetine, penicillin, phenytoin, propranolol, sulfonylureas, thyroxine, triiodothyronine, and warfarin. If reserpine or rauwolfia is combined with these drugs, one or the other may be displaced from albumin, leading to increased activity and/or toxicity. Caution is warranted.

Reserpine is synergistic and safe when combined with thiazide diuretics and hydralazines. However, it may cause hypotension when combined with any antihypertensive agent.

Monoamine oxidase inhibitors, tricyclic antidepressants, and possibly selective serotonin reuptake inhibitors and related agents may all interfere with the efficacy of reserpine.

Actions of direct-acting sympathomimetics are prolonged by reserpine while those of indirect-acting agents are inhibited.

sympathetic tone and reduction in blood pressure. This is an entirely central mechanism of action—there is no effect directly on the blood vessels or heart. Ajmaline and possibly other rauwolfia alkaloids also have an antiarrhythmic action.4

The Absurd Downfall of Reserpine

Initially, whole extracts of rauwolfia root were used clinically for their antihypertensive effects. The growing dominance of the reductionist model, however, pushed chemists to isolate reserpine and use it as a drug. The heroic medical model pushed clinicians to think that if a low dose of this new drug, reserpine, could lower blood pressure somewhat, then a higher dose could lower it even more. The ultimate result was overdosing and induction of severe adverse effects. This led to the erroneous view that not only low-dose reserpine but whole rauwolfia should not be used, despite critical differences between high-dose reserpine and these treatments.5

In fact, low-dose reserpine (0.05–0.25 mg, once per day) combined with a thiazide diuretic was the first therapeutic combination shown to reduce the various adverse effects of chronic hypertension, including stroke in large, double-blind trials.6,7 In these and other large-scale clinical trials, adverse effects were relatively mild. The most common was nasal stuffiness, which was reported by up to 20 percent of the study participants. Transient loose stools were also occasionally experienced. Depressed mood was experienced only extremely rarely. Low-dose reserpine was frequently combined with a thiazide diuretic in clinical trials. This category of drug is associated with hypokalemia, hypomagnesemia, and dyslipidemia. However, the adverse effects of thiazides on minerals can usually be overcome by increasing fruits and vegetables in the diet and having the patient take a potassium-magnesium supplement. In addition, in some trials, low-dose reserpine has been shown to counteract the adverse effects of thiazides on lipid levels.8

In contrast, high-dose reserpine (0.5–1 mg or more per day) is associated with frequent adverse effects of a more serious nature. Depletion of catecholamines by excessive reserpine can cause impotence, depression, Parkinsonism, and peptic ulcer. Low-dose reserpine has been repeatedly shown to be unrelated to impotence,9 depression, or Parkinsonism,10,11 or peptic ulcer.12 A reported association between reserpine and breast cancer in case-control studies reported in 1974 was ultimately proven to be spurious after ten subsequent, rigorous studies found no connection.5 The original studies had design flaws that caused the false connection between reserpine and cancer but, unfortunately, the connection stuck and the subsequent proof of its falsity was largely ignored. The theory that sympathetic blockade caused by reserpine could lead to difficulties if a patient went into shock or was hemorrhaging have not been investigated in any rigorous way.

In sum, low-dose reserpine is extremely safe, as well as far less expensive than any synthetic antihypertensive drugs.9 There are some drug interactions with reserpine that should be carefully noted (see box entitled Rauwolfia, Reserpine and Drug Interactions). It is effective for people in a wide range of race and age groups with hypertension. This is particularly true when reserpine is combined with a thiazide diuretic (and a potassium-magnesium supplement to offset mineral losses from the diuretic). Reserpine has a long half-life, so convenient once-daily dosing is appropriate. A trial of reserpine should almost universally be given to patients before other, far more expensive antihypertensive drugs are explored as long as the patients do not have histories of depression or Parkinson’s disease and are not allergic to reserpine, pregnant,* or lac-

*Rerspere is Food and Drug Administration pregnancy class C—unknown safety and should only be used if absolutely necessary in pregnancy.
tating. If reserpine alone is insufficient, a thiazide diuretic and potassium-magnesium supplement should be added. Synthetic antihypertensives should resorted to only if these options fail.

Whole Rauwolfia Versus Isolated Reserpine

Whole rauwolfia root extracts contain multiple alkaloids and other constituents and may be comparable, or superior, to isolated reserpine. Several old reports suggest that crude extracts of rauwolfia are comparable to isolated reserpine. The late Rudolf Fritz Weiss, M.D., a major force in German phytotherapy, felt that the whole plant had better overall efficacy and was safer than isolated reserpine. Unfortunately, modern science, without investigation, decided that such extracts were unreliable and, thus, not worth pursuing, instead opting for the single-agent drug model. While the older extracts were undoubtedly unreliable, this single-agent method discarded the important concept and potential benefits of synergism of action of multiple compounds within the plant without adequate study. Today, newer technologies allow for more rigorous control over crude extracts by sampling marker compounds in each batch to ensure that a set range or critical compounds are always present.

In the case of rauwolfia, the marker compound is obvious: It is reserpine. This marker compound has the advantage that it is clearly a critical component in the efficacy of rauwolfia. Thus, extracts standardized to reserpine content can allow for exact, reliable dosing without losing the other active and supporting constituents in rauwolfia. Because of the potential adverse effects of excessive reserpine and because the stakes are high if an insufficient dose is used and blood pressure is not adequately lowered, nonstandardized rauwolfia extracts are not recommended. The only standardized product that we are aware of is a tincture of the root made by HerbPharm of Williams, Oregon. This product contains 0.1 mg reserpine per 4 drops of tincture. The initial loading dose is approximately 4 drops, two or three times per day, for 1 week. The dose should then be decreased to 4 drops once per day. In cases of mild hypertension, 2 drops once a day may be sufficient. The dose may have to be adjusted until blood pressure is normalized. A maximum of 5 drops twice a day (i.e., 0.25 mg reserpine per day) is recommended to avoid serious adverse effects. If this dose is not sufficient, then a thiazide diuretic should be added along with potassium-magnesium, and possibly Allium sativum (garlic) if the thiazide causes dyslipidemia not offset by the rauwolfia. Note that because of the long half-life of reserpine, its effects will not wear off immediately upon discontinuation, and it will take some time (a few days) for its effects to be noticed. Thus, rauwolfia is not appropriate for the immediate blood pressure lowering needed in cases of malignant hypertension.

Mistletoe: Needs More Research

No botanical remedy for hypertension besides rauwolfia has been subjected to repeated, rigorous, large-scale clinical trials. Hence, no botanical remedy has consistently shown antihypertensive effects across a broad range of the population of patients with hypertension. Nevertheless, many other botanical medicines have some potential efficacy and deserve additional research. Viscum album (European mistletoe) leaf is one such remedy, although its effects on patients with hypertension have probably been overstated.

European mistletoe has a long history of ritual and medicinal use, as evidenced by the modern continuation of the pagan ritual of kissing someone caught standing under mistletoe at the Winter Solstice (adopted as Christmas by Christianity). The use of European mistletoe for hyper-
At least two controlled clinical trials have assessed the efficacy of reishi as a hypotensive.

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### Botanical Antihypertensive Agents

<table>
<thead>
<tr>
<th>Botanical agent</th>
<th>Common name</th>
<th>Part used</th>
<th>Family</th>
<th>Level of supporting evidence</th>
</tr>
</thead>
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<tr>
<td><em>Rauvolfia serpentina</em></td>
<td>Rauwolfia, Indian snakeroot</td>
<td>Radix</td>
<td>Apocynaceae</td>
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</tr>
<tr>
<td><em>Ganoderma lucidum</em></td>
<td>Reishi, ling zhi</td>
<td>Fruiting body et mycelium</td>
<td>Polyporaceae</td>
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<td><em>Allium sativum</em></td>
<td>Garlic</td>
<td>Bulbus</td>
<td>Liliaceae</td>
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<tr>
<td><em>Hibiscus sabdariffa</em></td>
<td>Roselle, sour tea</td>
<td>Flos</td>
<td>Malvaceae</td>
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<td>European mistletoe</td>
<td>Folium</td>
<td>Loranthaceae</td>
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</tr>
<tr>
<td><em>Crataegus laevigata</em></td>
<td>Hawthorn</td>
<td>Folium, flos et fructus</td>
<td>Rosaceae</td>
<td>4</td>
</tr>
<tr>
<td><em>Olea europaea</em></td>
<td>Olive</td>
<td>Folium</td>
<td>Oleaceae</td>
<td>5</td>
</tr>
</tbody>
</table>

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**Notes:****

a. In all cases, the first or single name given is the official one listed in the most recent version of McGuffin, M., Kartesz, J.T., Leung, A.Y., et al. *The American Herbal Products Association’s Herbs of Commerce.* (2nd ed.) Silver Spring, MD: American Herbal Products Association, 2000.

b. 1 = multiple positive controlled clinical trials; 2 = limited controlled clinical trial evidence; 3 = uncontrolled clinical trial evidence; 4 = traditional/empirical support only; 5 = negative clinical trial evidence.

d. Tension is not as ancient, only having been accepted to any large degree in Europe in the early 1900s.

In a case series involving 100 patients with hypertension, 2.5–5 mL of a tincture of dry mistletoe, three times per day, lowered blood pressure significantly in 25 percent of subjects who were treated with the tincture. Interestingly, 75 percent of the study participants reported reductions in headaches and dizziness. Most practitioners recommend use of a cold infusion of European mistletoe leaf, not the alcoholic tincture used in the study, which may have affected the results. Drastic changes in blood pressure in response to European mistletoe are rare. However, thoroughly controlled trials have not been conducted and no definite conclusions regarding its benefits can be drawn at this point in time. In our opinion, European mistletoe may have some role in reducing symptoms of hypertension but cannot be relied upon as a single therapy.

The toxicity of European mistletoe has been greatly exaggerated. Clinically, no adverse effects are associated with use of the cold infusion prepared by steeping 2–4 tsp of the leaf in 250 mL of water overnight (or throughout the day). The dose is 250 mL twice per day. American mistletoe, *Phoradendron* spp., is a close cousin of *Viscum*, is a very different plant that appears to have a hypertensive effect. Nevertheless, the toxicity of even American mistletoe has been exaggerated. One study found that 96 percent of people who reported accidental ingestion of mistletoe of any kind had no symptoms without receiving any therapy, 99 percent had no long-term effects, and there were no deaths.

**Reishi:** An Antihypertensive Mushroom

*Ganoderma lucidum, G. japonicum, or G. tsugae,* known as *reishi* in Japanese and *ling zhi* in Chinese, is a medicinal mushroom of great importance in traditional Asian medicine.

The triterpenoids (the ganoderic acids) have shown angiotensin-converting enzyme inhibiting effects in vitro. An animal study suggested that reishi might also work via central inhibition of sympathetic outflow, somewhat similar to the way reserpine works. This study utilized an extract of the mycelium of reishi, suggesting that extracts combining fruiting body and mycelium might be optimal to achieve all that reishi has to offer.

At least two controlled clinical trials have assessed the efficacy of reishi as a hypotensive. In the most recent trial, 54 men and women with moderate hypertension who had not responded to captopril or nimodipine alone after 1 month were randomized to receive 55 mg of reishi extract three times per day or placebo (the synthetic drugs were continued simultaneously). Reishi lowered blood pressure significantly (an average change in diastolic pressure from 75 to 64) compared to baseline while placebo had no such effect. A less-rigorous prior trial showed that 240 mg of a different reishi extract, given six times per day had hypotensive effects.

No adverse effects were encountered in either trial. More research is obviously needed to confirm...
these preliminary results but it appears that reishi’s reputation as a mild, completely safe hypotensive is deserved.

The “Stinking Rose”

*Allium sativum* (sometimes called the “stinking rose”) bulb’s primary use continues to be countering dyslipidemia. There are surprisingly few trials that have specifically addressed whether garlic lowers blood pressure. A meta-analysis of three trials that specifically included hypertensive subjects and four other studies that included some patients with hypertension, incidentally, found that garlic had a mild hypotensive effect overall.25 The authors of this meta-analysis state that most of the trials they examined were relatively small, did not last very long, and had other problems. In addition, some had inappropriate randomization methodologies. This increased the likelihood that the apparent hypotensive effect of garlic was the result of chance. All of the studies assessed used a dried garlic powder standardized to allicin content (amount unspecified), 300 mg two to three times per day.

Garlic is obviously widely consumed as food and has almost no adverse effects. Some people dislike the body odor associated with garlic use, some develop gastrointestinal irritation, and, in extremely rare instances, easy bleeding. Garlic should be a component of the diet of any patient with hypertension. Uncooked, chopped, fresh garlic appears to be most effective. If a patient is unwilling to eat raw garlic, then encapsulated products containing allicin can be used. Enteric coating reduces odor in these products, but “odorless” products devoid of allicin (e.g., garlic oil or aged garlic extract) have not been demonstrated to have the same effects as allicin-containing products, except at exorbitant doses, and should be avoided.

**Hawthorn, Hibiscus, and Hypertension**

*Crataegus laevigata* (hawthorn), formerly *C. oxyacantha*, and its close cousins *C. monogyna*, *C. piperi*, *C. rivularis*, and *C. douglasii*, commonly find their way into hypertension formulae prescribed by botanical medicine practitioners. The leaf, flower, and fruit of this Rosaceae family plant are all utilized. There is little human research documenting an antihypertensive effect of hawthorn, although it may have some beneficial effects on the hearts of patients who are affected by hypertension.26,27 Some older case studies suggest that hawthorn may be hypotensive28 but, apparently, no one has attempted to confirm these results in controlled trials. Hawthorn is completely nontoxic and may be useful as a cardiovascular tonic in the overall treatment of patients with hypertension but, used alone, is extremely unlikely to lead to major, measurable decreases in blood pressure in all but the rarest patients.

*Hibiscus sabdariffa* (hibiscus, sour tea, roselle) is a plant that is much loved for its beauty as well as the flavor of its flower in beverage teas. To evaluate the traditional reputation of hibiscus flower as a hypotensive, a randomized, controlled clinical trial was conducted with 54 men and women with hypertension in Tehran, Iran.29 Volunteers took either hibiscus tea or black tea (*Camellia sinensis*) in the very low dose of 1 cup of tea per day (2 tbsp herb per glass of water) for 12 days. Although the trial was supposedly double-blind, it is hard to imagine that the subjects were not able to tell by taste which tea they were drinking. There was a significantly greater drop in blood pressure in the hibiscus-treated group compared to the regular tea–treated group. There were no adverse effects. The results of this initial trial suggest the need for more research on this benign, tasty botanical medicine. *H. rosa-sinensis* is a possible substitute for *H. sabdariffa*.

**Olive Leaf**

The oil of *Olea europaea* (olive) is well-known to most people, but it is the leaf of this important plant that primarily is used as medicine. The leaf is rich in flavonoids, bitter terpenoids, and glycosides, all of which may be clinically active. Extracts of olive leaf have been touted for treatment of patients with hypertension, although there is little research support for this idea. One double-blind trial conducted for 3 months apparently found no difference between 400-mg olive-leaf extract given four times per day and placebo for lowering blood pressure.30 Because the original trial was published in French, we had trouble obtaining details about the exact nature of this study or its exact results. For instance, some, but not all, of the subjects in the trial apparently continued to take synthetic antihypertensive medications during the trial. In any event, pending publication of positive, controlled clinical trials, there is little basis on which to recommend olive leaf for people with hypertension.

**Conclusion**

Lifestyle changes comprise the treatment of choice in patients with essential hypertension. When these first-line interventions do not succeed, botanical medicines should play a wider role in treatment of hypertension. Various phytomedicines are likely to prove useful to these patients (see box entitled Botanical Antihypertensive Agents). The best studied and most effective is rauwolfia or isolated reserpine. Used in the appropriate dose, this therapy is quite safe and much more cost effective than synthetic antihypertensives. Other less well-sup-
Prescription antihypertensives should be reserved for patients who are not adequately benefited by lifestyle changes, nutritional supplements, and/or botanicals.

References

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