

# Botanical Medicine for Thyroid Regulation

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## Abstract

Various herbal medicines show enormous promise when it comes to hyperthyroid conditions. Of particular note are bugleweed (*Lycopus virginicus*), gypsywort (*Lycopus europaeus*), water horehound (*Lycopus lucidus* or *Lycopus americanus*), gromwell (*Lithospermum ruderale*), and European gromwell (*Lithospermum officinale*).

Lemonbalm (*Melissa officinalis*) also shows promise in the treatment of hyperthyroidism, and rosemary (*Rosmarinus officinalis*) and sage (*Salvia officinalis*) should be investigated, given their similarities to lemon balm. Bladderwrack (*Fucus vesiculosus*), a brown algae, occupies a unique place in therapy in that the herb is used for treating both hyperthyroidism and hypothyroidism, although the seaweed's effects are poorly understood.

Other herbs—often used for treating hypothyroidism, such as gotu kola (*Centella asiatica*), coleus or forskohlii (*Plectranthus barbatus*, also known as *Coleus forskohlii*), guggul (*Commiphora mukul*), and ashwagandha (*Withania somnifera*)—have varying degrees of preclinical research support but are less clearly effective in practice.

## Introduction

Thyroid dysfunctions of various types plague the health of Western society. Most authoritative sources agree that the annual incidence of hyperthyroidism in the West is 1 in 1000 women or 10,000 men; the incidence of hypothyroidism is at least ten times as great. The problem is accelerating, in part, because of environmental pollution that damages the thyroid. Some of this damage has come from incidents of intentional pollution, such as the infamous 1949 Green Run experiment, which deliberately exposed a wide swath of the Pacific Northwest of the United States to radiation released from the Hanford Nuclear Reservation.<sup>1</sup>

Although little research has been done, there are many herbal medicines that provide treatment options to patients with thyroid disorders. It is our experience that herbal medicines for hyperthyroid patients are generally effective for reducing symptoms regardless of etiology, though additional treatment to address the cause(s) should always be undertaken.

Greatest efficacy has been observed in patients with Graves' address disease. No clear evidence of negative interactions with thyroid medications has been observed. Efficacy in patients with hypothyroidism is much more variable, and other treatments—including, but not limited to, thyroid hormone replacement—should generally accompany herbal therapy. Herbal treatment of patients with serious thyroid conditions should only be undertaken in consultation with an experienced practitioner of botanical medicine.

## Bugleweed: A Thyrosuppressive

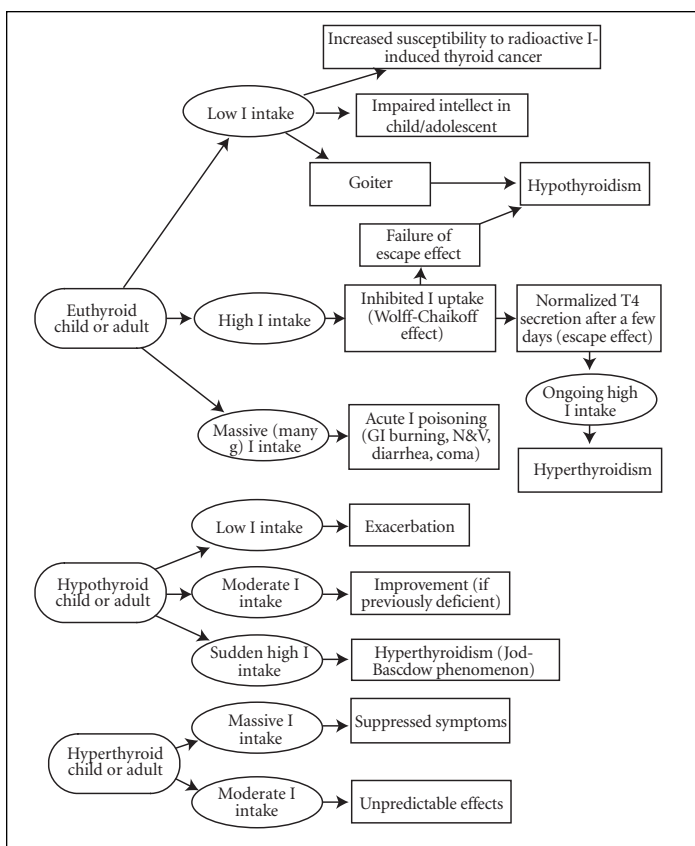
One of the more surprising things about herbs for thyroid disorders is that the herbs that *suppress* thyroid function are the ones that are most effective. In most other areas of medicine, herbal tonics that support or augment normal function stand out as most effective. This is simply not the case with the thyroid.

Bugleweed is native to North America and is found east of the Mississippi River. The herb is a member of the Lamiaceae (mint) family. Many other members of this family are also thyrosuppressive, suggesting that there is a common set of constituents present in the Lamiaceae that have the same activity. The most likely candidates, based on work with bugleweed and other herbs, are various hydroxycinnamic-acid-derived simple plant acids, such as lithospermic, rosmarinic, caffeic, and chlorogenic acids.

At least three other *Lycopus* species are similarly used around the world—gypsywort from Europe, an Asian variety of water horehound from Asia, and a North American variety of water horehound. At least one in vitro study has found extracts of bugleweed and gypsywort to be equally effective.<sup>2</sup>

Historically, the effects of bugleweed have been related to the heart and lungs. For instance, the noted Eclectic physician Harvey Wickes Felter, M.D., wrote in 1922 that bugleweed was primarily used for “vascular excitement, with rapid, tumultuous action of the heart, but lacking power.”<sup>3</sup> He also described this herb as a remedy for bleeding in various organs, coughs, and diabetes—all situations when a rapid heartbeat was present.

Bugleweed, however, also was used by the Eclectics for treating insomnia in acute and chronic diseases, and to treat exophthalmic goiter.<sup>4</sup> One of the main symptom pictures for the herb's use was wakefulness and morbid vigilance with an inordinately active circulation and rapid pulse. This coincides with the fact that patients with hyperthyroidism often experience insomnia, palpitations, and tachycardia.



**Figure 1. Iodine and the thyroid.** The effect of iodine supplementation—from bladderwrack or any other source—is tricky, and depends on the initial state of the person who is taking the supplement and the level of supplementation. This diagram is not an exhaustive depiction but is meant to show the majority of possible reactions of various populations to supplementation with bladderwrack or other seaweeds. Drawing © 2006 by Eric Yarnell, N.D., R.H. (A.H.G.). I = iodine; GI = gastrointestinal.

Bugleweed and gypsywort have been studied for their effects on the thyroid since at least the 1950s in Germany.<sup>5</sup> Bugleweed and its extracts (or those of its cousins) have many beneficial effects that might explain its efficacy for reducing hyperthyroid symptoms. These effects include the ability to inhibit binding of the stimulating antibodies of Graves' disease to the thyroid cells; blocking thyroid-stimulating hormone (TSH) production; decreasing peripheral T4 deiodinization; and possibly inhibiting iodine metabolism.<sup>6-8</sup> However, there appear to be no human clinical trials documenting the efficacy of bugleweed for hyperthyroidism or any other indication.

Bugleweed and its cousins do have other documented effects. Extracts have been shown to decrease prolactin levels and to inhibit secretion of luteinizing hormone (LH) and follicle-stimulating hormone (FSH).<sup>9</sup> One case study found that 5–13 g of a freeze-dried bugleweed extract taken daily for 1 month decreased LH secretion in 1 woman.<sup>10</sup> It has been demonstrated that gypsywort enhances the efficacy of various antibiotic drugs against drug-resistant microbes *in vitro*.<sup>11</sup>

More recently, water horehound has been studied more extensively in Asia and has shown some very interesting properties, such as producing antioxidant activities; decreasing blood viscosity; and having antiallergic effects.<sup>12-14</sup> Given all this potential, clearly, bugleweed and its relatives deserve more research, and should be investigated in clinical trials.

Traditionally, aqueous extracts have been the most-prepared form of bugleweed and its cousins, although the Eclectics often used alcoholic extracts. At least one study found that tinctures prepared using 70 percent ethanol had much higher levels of the critical hydroxycinnamic acid derivatives than aqueous extracts.<sup>15</sup> A typical dose of tincture is 2–4 mL three times per day for an average-size adult. More may be required initially to treat the more severe hyperthyroid symptoms.

To prepare a tea, a patient should infuse 2–3 teaspoons (5–10 g) of air-dried herb in a cup (250 mL) of hot water, covered, for 15–20 minutes. The patient should drink 1 cup of this tea three

### Dr. Silena Heron's ThyroNix Formula

The late Silena Heron, N.D.—the mentor of Dr. Yarnell—created a formula known as Dr. Heron's ThyroNix. Together with Dr. Yarnell, Dr. Heron used her ThyroNix successfully for many years in practice in several patients with hyperthyroidism (primarily Graves' disease).

These patients often took the formula for months or years continuously. We also recommended this formula to several other clinicians who subsequently reported it as efficacious; no adverse effects were encountered despite long-term use.

This formula, described in the table below, often was adjusted to an individual patient to fit the patient's exact situation. It is not certain exactly why no one ever appeared to have developed liver toxicity or gonadotropin suppression from this formula; all we can state is that we have never encountered any such problems.

Common name	Latin binomial	Extract used	% in Formula
Gromwell	<i>Lithospermum ruderale</i>	Tincture of fresh root	10–15
Bladderwrack	<i>Fucus vesiculosus</i>	Tincture of dried thallus	10–20
Motherwort	<i>Leonurus cardiaca</i>	Tincture of fresh herb	10–20
Bugleweed	<i>Lycopus virginicus</i>	Tincture of fresh herb	10–20
Lemonbalm	<i>Melissa officinalis</i>	Tincture of fresh herb	10–20
Watercress	<i>Rorippa nast-aquat.</i>	Glycerite of fresh herb	5–10
Mullein leaf	<i>Verbascum thapsus</i>	Glycerite of fresh leaf	5–10
Horseradish	<i>Armoracia rusticana</i>	Tincture of fresh root	5–10

Dose: 1 tsp (5 mL) three times per day for an average-size adult.

times per day. This dose may be able to be decreased over time.

Few if any adverse effects have been observed with bugleweed in practice, although the herb should not theoretically be given to people with hypothyroidism or during pregnancy.

### Other Minty Thyrosuppressives

Lemonbalm is a gentle herb that is also from the Lamiaceae family. This herb has long been a favorite for treating infant colic and even viral infections in newborns, attesting to lemonbalm's gentleness. Old European herbalists report its memory-improving properties; the German Commission E has approved the herb's use for nervous sleeping disorders; and the European Scientific Cooperative on Phytotherapy lists lemonbalm's use for restlessness, irritability, digestive disorders, and cold sores.<sup>16</sup> Although lemonbalm has no history of use for hyperthyroid conditions, clinicians are increasingly including the herb as a component of herbal formulas for hyperthyroidism.

Although lemonbalm is widely used as a nervine and an antiviral, there are no reports of anyone developing hypothyroidism while taking the herb for other conditions, nor are there any suggestions that persons who have hypothyroidism should not use lemonbalm.

This clinical experience suggests (but does not prove) that lemonbalm, like *Lycopus* spp., will only inhibit an overactive thyroid and not one that is functioning normally.

Current use of lemonbalm in hyperthyroidism is based in large measure on pharmacologic studies. In vitro, lemonbalm has inhibited binding of TSH to thyroid follicles, blocked peripheral deiodination of T<sub>4</sub>, and blocked the stimulating autoantibodies of Graves' disease.<sup>6,17</sup> In addition, lemonbalm has historically been considered to be useful for calming the heart. There are thus many similarities between lemonbalm and bugleweed.

However, lemonbalm contains higher levels of low-molecular weight terpenoids, such as citral and citronellal, than does bugleweed, and this, at least in part, contributes to effects not generally seen in bugleweed. Lemonbalm is an antiviral, most notably against herpes simplex, and is also a smooth-muscle spasmolytic and nervine.<sup>18-20</sup> A recent double-blinded clinical trial documenting the herb's benefits in patients with Alzheimer's disease showed more properties specific to lemonbalm.<sup>21</sup>

We have not used lemonbalm alone as a treatment for hyperthyroidism but, in our clinical practice, lemonbalm has seemed to enhance the action of bugleweed. Lemonbalm's possible synergistic effects in this condition deserve research.

A usual dose of lemonbalm tincture (60 percent plus ethanol) is 3-5 mL three times per day for an average-size adult. There are no known contraindications.

Lemonbalm resembles several other Lamiaceae family plants in its nonthyroid actions, particularly rosemary and sage. Both of these herbs are antiviral, antioxidant, nervine, and spasmolytic, and contain both hydroxycinnamic-acid derivatives and low-molecular-weight terpenoids. While neither rosemary nor sage is considered thyrosuppressive, it is entirely possible they



Rosemary (*Rosmarinus officinalis*).

both may have such actions and should be investigated for this. The same holds true of other members of this family with similar constituent profiles.

### Gromwell: A Different Story

Two herbs with actions that are very similar to—although somewhat stronger than—bugleweed's are gromwell from North America and from Europe. These herbs are in the Boraginaceae family. They also contain hydroxycinnamic-acid derivatives, such as lithospermic acid, which are similar to those seen in Lamiaceae thyrosuppressives. However, these herbs also contain naphthoquinone compounds and unsaturated pyrrolizidine alkaloids that distinguish them from bugleweed or lemonbalm.

Gromwell has basically been shown to act similarly to bugleweed. For instance, gromwell blocks binding of TSH to thyroid follicles, inhibits iodide transport into thyroid follicles, decreases peripheral deiodination of T<sub>4</sub>, and blocks thyroid hormone secretion.<sup>2,22</sup> It is also clear that gromwell blocks secretion of LH and FSH, with minimal-to-no effects on direct binding of estrogen, progesterone, or testosterone to their receptors.<sup>23-25</sup> In general, gromwell seems to be a more potent producer of these actions than bugleweed or lemonbalm. However, gromwell can therefore also be more dangerous.

The unsaturated pyrrolizidine alkaloids (UPAs) in gromwell are the constituents of concern. These compounds have caused severe liver and kidney damage when ingested by animals from other plants. As yet, however, there are no reports of them causing any harm to humans. The apparent toxicity of these alkaloids is difficult to reconcile with the fact that the herb has been used for millennia and usually for long periods of time without any report of UPA toxicity.

It is possible that the relatively low levels of alkaloids in these plants, and/or the fact that they were traditionally prepared as teas, which would not be as effective at extracting



Sage (*Salvia officinalis*).

alkaloids, could explain this. In addition, liver disease actually caused by gromwell may not have been attributed to a distant herbal ingestion. Most experts therefore still caution against long-term use of gromwell to avoid any risk of pyrrolizidine alkaloid toxicity. (See box entitled Dr. Silena Heron's ThyroNix Formula.)

To minimize the content of alkaloids (which are not known to produce any benefits in terms of thyroid health, and so can be removed) in the herb, a low-ethanol tincture is utilized with an acidic menstruum. Typically, no more than 40 percent ethanol is used. The usual dose is 1–2 mL three times per day for an average-size adult. This herb should definitely not be used during lactation or pregnancy because fetuses are more sensitive to unsaturated pyrrolizidine alkaloids.

On a final note, the Chinese herb zicao (*Lithospermum erythrhizon*) root has been shown to contain various naphthoquinones, notably a compound dubbed shikonin. Numerous studies have documented a range of effects of this herb in general and shikonin in particular, including inhibition of HIV, suppression of angiogenesis, inhibition of *Helicobacter pylori* and decreasing resistance of this organism to antibiotics, induction of apoptosis in cancer cells, and many more.<sup>26–29</sup> In one highly preliminary case series from China, shikonin significantly improved the clinical status of patients with inoperable lung cancer and appeared to lengthen life span in some of these patients.<sup>30</sup>

Whether gromwell has any of these effects is unknown. What is equally unknown is whether zicao has any effect on the thyroid or gonadotropins.

## The Dual Nature of Bladderwrack

*Fucus vesiculosus* (bladderwrack) and closely related brown algae in the family Fucaceae—particularly blackwrack (*F. serratus*)—are not plants at all, but photosynthetic protists. Unlike plants, they do not have specialized protective structures around their gametes and do not undergo embryonic development. Unlike fungi, they do not have chitin in their cell walls. Thus, seaweeds such as bladderwrack are in their own separate kingdom, Protista. The part of bladderwrack that is used medicinally is known as the thallus, the undifferentiated frond often seen lying on beaches.

Bladderwrack has historically been used to regulate and protect the thyroid, regardless of whether it is hyperactive, normal, or underactive.<sup>31</sup> Despite this, there is actually very little information available about the effects of this seaweed on the thyroid.

Bladderwrack and all seaweeds contain substantial but variable quantities of iodine. One study on commercially available seaweeds in the United States found a range of 16 to more than 8000 mcg/g of iodine.<sup>32</sup> Dried bladderwrack generally contains approximately 0.05 percent iodine, or 50 mcg/g. The effects of iodine on the thyroid are very complex, and may help explain the ability of bladderwrack to help some people with hypothyroidism and others with hyperthyroidism (see Fig. 1).

The German Commission E states that daily ingestion of more than 150 mcg of iodine from bladderwrack could induce or exacerbate hyperthyroidism. Total daily iodine intake should generally not exceed 1000 mcg, although there is wide individual variability in sensitivity.<sup>33</sup> In one study, healthy subjects given 2 or 4 capsules of kelp (probably *Laminaria*) per day had significant elevations in TSH levels and decreased T3 levels compared to baseline, while patients taking alfalfa capsules had no such changes.<sup>34</sup>

Although Hashimoto's thyroiditis is common in Japan where dietary seaweed and thus iodine intake is very high, researchers disagree about whether differences in iodine levels between affected and unaffected patients explain the incidence of this condition.<sup>35,36</sup>

The bottom line is that the true effects of bladderwrack on patients with thyroid conditions are unknown, but low levels of supplementation are probably safe in most patients. Patients who are clearly iodine-deficient can obtain reasonable amounts of iodine by eating 1–2 g of dried bladderwrack per day. Anyone who is clearly consuming more than 1000 mcg of iodine per day already probably will not benefit and may be harmed from bladderwrack supplementation.

## Other Herbs for Treating Hypothyroidism

Despite the boundless enthusiasm on the Internet about herbs for hypothyroidism, there is little evidence documenting the efficacy of any herbs in patients with the condition. The sole exceptions are a number of open clinical trials conducted on a variety of herbal formulas in China for what they call Kidney *yang* deficiency (and what we would call hypothyroidism) showing benefit.<sup>37</sup> But with the exception of these studies, clinical information on herbal treatments for hypothyroidism is entirely lacking.



Yet there are a number of herbs that hold promise. One of these is the adaptogen ashwagandha. Ashwagandha administered daily to female mice increased serum thyroxine (T4) concentrations in one study.<sup>38</sup> Fish exposed to organochlorine pesticides had elevated TSH levels that were normalized by treatment with the aqueous root extract of ashwagandha and shankpushpi (*Convolvulus pluricaulis*).<sup>39</sup>

There is a Dutch case report of a healthy woman who developed thyrotoxicosis while taking ashwagandha capsules for fatigue. Her symptoms resolved after discontinuing the capsules.<sup>40</sup> As the paper was in Dutch we were unable to review the entire paper to determine whether the capsules contained other herbs and whether its conclusion in the abstract that ashwagandha was responsible for elevating her thyroid levels was sound. This case does nonetheless support the animal studies suggesting that ashwagandha can stimulate thyroid function.

Gotu kola leaf is commonly recommended in hypothyroidism, and the noted Southwestern herbalist Michael Moore has written that this herb stimulates T4 synthesis (Michael Moore, personal communication). We, however, were unable to locate any data documenting gotu kola's effect on the thyroid and have not found it to have remarkable clinical effects in our practice.

Other herbs that have a potential place in the treatment of hypothyroidism are baubinia (*Bauhinia purpurea*) bark, forskholii or coleus leaf, and guggul gum resin. Clinical evidence supporting their efficacy is lacking, however, and they are not widely used by Western herbalists.

In mice, baubinia administered orally increased both T3 and T4 levels in one study and, combined with ashwagandha and guggul, again, increased both levels.<sup>38,41</sup> Guggul gum resin at 200 mg/kg daily counteracted drug-induced hypothyroidism in female mice in one study.<sup>42</sup> However, one case series in humans found that 750 mg guggulsterone daily from guggul had no effect on thyroid function in obese patients.<sup>43</sup>

Finally, coleus leaf is sometimes recommended for hypothyroidism based on the herb's mechanism of action—coleus stimulates adenylate cyclase. For that reason, there is a theoretical argument that it is capable of mimicking the effect of TSH, which also activates adenylate cyclase when binding to the TSH receptor. In vitro, the compound forskolin (derived from coleus leaf) increased T4 synthesis by thyroid follicles.<sup>44</sup> No clinical data could be located.

Further research on the ability of these herbs to stimulate thyroid function is needed, as hypothyroidism is a common condition that is inadequately treated.

## Conclusions

Given the promising preclinical research and supportive empirical results from clinical practice, bugleweed, lemonbalm, gromwell, and possibly other Lamiaceae family plants should be studied in clinical trials on patients with hyperthyroidism as relatively safe and inexpensive alternatives to thyrostatic drugs. Much less information is available supporting the use of herbs for patients with hypothyroidism, although there is still an

urgent need for research in this area, given the large degree to which people are likely taking various herbs in an attempt to remedy this common condition. □

## References

1. Department of Energy Office of Human Radiation Experiments. Chapter 11: Advisory Committee on Human Radiation Experiments (ACHRE) Final Report. Intentional Releases. Online document at: [www.eh.doe.gov/ohre/roadmap/achre/chap11\\_1.html](http://www.eh.doe.gov/ohre/roadmap/achre/chap11_1.html) Accessed March 20, 2006.
2. Auf'mkolk M, Ingbar JC, Amir SM, et al. Inhibition by certain plant extracts of the binding and adenylate cyclase stimulatory effect of bovine thyrotropin in human thyroid membrane. *Endocrinology* 1984;115:527–534.
3. Felter HW. *Eclectic Materia Medica: Pharmacology and Therapeutics*. Sandy, OR: Eclectic Medical Publications, 1922; reprinted 1998.
4. Felter HW, Lloyd JU. *King's American Dispensatory*. Sandy OR: Eclectic Medical Publications, 1983.
5. Hiller E, Deglmann H. The effect of *Lycopus europeus* extracts on the distribution of iodine in human serum [in German]. *Arzneim Forsch* 1955;5:465–470.
6. Auf'mkolk M, Ingbar JC, et al. Extracts and auto-oxidized constituents of certain plants inhibit the receptor-binding and biological activity of Graves' disease immunoglobulins. *Endocrinology* 1985;116:1687–1693.
7. Kohrle J, Auf'mkolk M, et al. Iodothyronine deiodinases: Inhibition by plant extracts. *Acta Endocrinol Suppl* 1981;16:188–192.
8. Winterhoff H, Gumbinger HG, Vahlensieck U, et al. Endocrine effects of *Lycopus europaeus* following oral application. *Arzneim Forsch* 1994;44:41–45.
9. Sourgens H, Winterhoff H, Gumbinger HG, Kemper FH. Antihormonal effects of plant extracts: TSH and prolactin-suppressing properties of *Lithospermum officinale* and other plants. *Planta Med* 1982;45:78–86.
10. Wiesner BP, Yudkin J. Inhibition of oestrus by cultivated gromwell. *Nature* 1952;170:274–275.
11. Gibbons S, Oluwatuyi M, Veitch NC, Gray AI. Bacterial resistance modifying agents from *Lycopus europaeus*. *Phytochemistry* 2003;62:83–87.
12. Shi HZ, Gao NN, Li YZ, et al. Effects of L.F04, the active fraction of *Lycopus lucidus*, on erythrocytes rheological property. *Chin J Integr Med* 2005;11:132–135.
13. Woo ER, Piao MS. Antioxidative constituents from *Lycopus lucidus*. *Arch Pharm Res* 2004;27:173–176.
14. Shin TY, Kim SH, Suk K, et al. Anti-allergic effects of *Lycopus lucidus* on mast cell-mediated allergy model. *Toxicol Appl Pharmacol* 2005;209:255–262.
15. Winterhoff H, Gumbinger HG, Sourgens H. On the antigonadotropic activity of *Lithospermum* and *Lycopus* species and some of their phenolic constituents. *Planta Med* 1988;54:101–106.
16. Blumenthal M, Goldberg A, Brinckmann J, eds. *Herbal Medicine: The Expanded and Revised Commission E Monographs*. Newton, MA: Integrative Medicine Communications, 2000.
17. Auf'mkolk M, Kohrle J, Gumbinger H, et al. Antihormonal effects of plant extracts: Iodothyronine deiodinase of rat liver is inhibited by extracts and secondary metabolites of plants. *Horm Metab Res* 1984; 16:188–192.
18. Koytchev R, Alken RG, Dundarov S. Balm mint extract (Lo-701) for topical treatment of recurring herpes labialis. *Phytomedicine* 1999;6:225–230.
19. Kennedy DO, Little W, Scholey AB. Attenuation of laboratory-induced stress in humans after acute administration of *Melissa officinalis* (lemon balm). *Psychosom Med* 2004;66:607–613.
20. Madisch A, Melderis H, Mayr G, et al. A plant extract and its modified preparation in functional dyspepsia: Results of a double-blind placebo controlled comparative study [in German]. *Z Gastroenterol* 2001; 39:511–517.
21. Akhondzadeh S, Noroozian M, Mohammadi M, et al. *Melissa officinalis* extract in the treatment of patients with mild to moderate Alzheimer's

- disease: A double blind, randomized, placebo controlled trial. *J Neurol Neurosurg Psych* 2003;74:863–866.
22. Winterhoff H, Sourgens H, Kemper FH. Antihormonal effects of plant extracts: Pharmacodynamic effects of *Lithospermum officinale* on the thyroid gland of rats. Comparison with the effects of iodide. *Horm Metab Res* 1983;15:503–507.
  23. Kemper F. Experimental basis for the therapeutic use of *Lithospermum officinale* for blocking of anterior pituitary hormones. *Arzneim Forsch* 1959;9:411–419.
  24. Findley WE, Hollstein U, Besch PK. Effect of purified lithospermic acid and its oxidation product on luteinizing hormone release in vitro. *Biol Reprod* 1985;33:309–315.
  25. Findley WE, Jacobs BR. The antigonadotropic activity of *Lithospermum ruderale*: I. The lack of steroid-like activity at the receptor level. *Contraception* 1980;21:199–205.
  26. Chen X, Yang L, Zhang N, et al. Shikonin, a component of Chinese herbal medicine, inhibits chemokine receptor function and suppresses human immunodeficiency virus type 1. *Antimicrob Agents Chemother* 2003;47:2810–2816.
  27. Hisa T, Kimura Y, Takada K, et al. Shikonin, an ingredient of *Lithospermum erythrorhizon*, inhibits angiogenesis in vivo and in vitro. *Anticancer Res* 1998;18:783–790.
  28. Kuo HM, Hsia TC, Chuang YC, et al. Shikonin inhibits the growth and N-acetylation of 2-aminofluorene in *Helicobacter pylori* from ulcer patients. *Anticancer Res* 2004;24:1587–1592.
  29. Gao D, Hiromura M, Yasui H, Sakurai H. Direct reaction between shikonin and thiols induces apoptosis in HL60 cells. *Biol Pharm Bull* 2002;25:827–832.
  30. Guo XP, Zhang XY, Zhang SD. Clinical trial on the effects of shikonin mixture on later stage lung cancer [in Chinese]. *Zhong Xi Yi Jie He Za Zhi* 1991;11:580,598–589.
  31. Mills SY. *Out of the Earth: The Essential Book of Herbal Medicine*. Middlesex, UK: Viking Arkana, 1991.
  32. Teas J, Pino S, Critchley A, Braverman LE. Variability of iodine content in common commercially available edible seaweeds. *Thyroid* 2004;14:836–841.
  33. Pennington JA. A review of iodine toxicity reports. *J Am Diet Assoc* 1990;90:1571–1581.
  34. Clark CD, Bassett B, Burge MR. Effects of kelp supplementation on thyroid function in euthyroid subjects. *Endocr Pract* 2003;9:363–369.
  35. Nagata K, Takasu N, Akamine H, et al. Urinary iodine and thyroid antibodies in Okinawa, Yamagata, Hyogo, and Nagano, Japan: The differences in iodine intake do not affect thyroid antibody positivity. *Endocr J* 1998;45:797–803.
  36. Konno N, Iizuka N, Kawasaki K, et al. Screening for thyroid dysfunction in adults residing in Hokkaido, Japan, in relation to urinary iodide concentration and thyroid autoantibodies [in Japanese]. *Hokkaido Igaku Zasshi* 1994;69:614–626.
  37. Li WJ, et al. Treating hypothyroidism with Chinese herbs: A review [in Chinese]. *Natl J Med Forum* 1998;13:39–41.
  38. Panda S, Kar A. *Withania somnifera* and *Bauhinia purpurea* in the regulation of circulating thyroid hormone concentrations in female mice. *J Ethnopharmacol* 1999; 67:233–239.
  39. Nath A. Serum hormonal imbalance and altered reproductive physiology in fish due to aquatic ecotoxicity: A preventative approach. *J Eco-physiol Occup Health* 2003;3(1–2):37–49.
  40. Van der Hooff CS, Hoekstra A, Winter A, et al. Thyrotoxicosis following the use of ashwagandha [in Dutch]. *Nederlands Tijdschrift voor Geneeskunde* 2005;149:2637–2638.
  41. Panda S, Kar A. Combined effects of ashwagandha, guggulu and bauhinia extracts in the regulation of thyroid function and on lipid peroxidation in mice. *Pharm Pharmacol Comm* 2000;6:141–143.
  42. Panda S, Kar A. Guggulu (*Commiphora mukul*) potentially ameliorates hypothyroidism in female mice. *Phytother Res* 2005;19:78–80.
  43. Antonio J, Colker CM, Torina GC, et al. Effects of a standardized guggulsterone phosphate supplement on body composition in overweight adults: A pilot study. *Curr Ther Res* 1999;60:220–227
  44. Saunier B, Dib K, Delemer B, et al. Cyclic AMP regulation of Gs protein: Thyrotropin and forskolin increase the quantity of stimulatory guanine nucleotide-binding proteins in cultured thyroid follicles. *J Biol Chem* 1990;265:19942–19946.
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