Restorative Medicine Herbs for Thyroid Disorders

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Financial Disclosure

- Consultant for Restorative Formulations
- I have been a Natural Products and Cannabis Industry Consultant, for GMPs, Regulatory Issues, Pharmacology, Research Initiatives, New Product Development and Formulation
- I have financial interests in the Natural Products Industry
Mind Map of Lecture

- Introduction
- Hyper-Thyroidism
- Hypo-Thyroidism
- Adrenal Herbs
- Herbal Medicine
- Clinical Tips On Formulation
Botanical Medicines??

- 88% of the world’s population relies predominantly on herbal medicines for some aspect of primary care.
- 25% of all dispensed prescription drugs in North America are derived from plants.

Plants as Medicine?

Of the ~500 new chemical entities approved by regulatory authorities around the world in the past decade, nearly half are from natural sources.

Of the 119 pure chemical compounds extracted from higher plants used in medicine throughout the world, 74% of these compounds have the same or related use as the plants from which they were derived.

Plant Medicine Safety?

History of uses is acceptable as proof of safety

World Health Organization
BROADER APPLICATIONS FOR THYROID HORMONE THERAPY

- Conditions where thyroid hormones may be therapeutic include:
  - Obesity
  - Cardiovascular disease
  - Osteoporosis
  - Depression
ENVIRONMENTAL TOXINS AND CONTRIBUTORS TO THYROID DISEASE

- **POPs!**
- **HALIDES:** Bromine, Chlorine, Flourine
  May interfere with iodine uptake
- **CHEMICALS:** Organochlorides, PCBs. PBDEs
  May agonize, antagonize TH receptors, and other with other endocrine disruption
- **HEAVY METALS:** Cadmium, Lead, Mercury
  May Interfere with T3-T4 Conversion, and ultimately lower T3 levels
- **LOW ANTIOXIDANT LEVELS:** Vitamins E, C, Selenium
  May reduce protective mechanisms against the above heavy metals and chemicals
CLINICAL TOOLS FOR HYPOTHYROIDISM
Hypothyroidism

- Hypothyroidism affects a significant % of the population, and may occur in tandem with metabolic syndrome, both being associated with:
  - Hyperlipidemia
  - Dysglycemia
  - Reproductive Issues
SEAWEED FOR HYPOTHYROIDISM
Fucus

Traditional Uses

• Used as a food
  – burned to ash for a salty flavor

• Used as a medicine
  – topically for skin and in body wraps to support weight loss
  – orally for cancer, inflammation, goiter, and thyroid disease
Seaweeds are high in numerous minerals and halides including iodine.

The bioavailability of the iodine in seaweed has been shown to be quite good, though slightly less than direct KI supplementation.

Not only do seaweeds such as *Fucus* provide iodine, seaweeds are reported to contain di-iodotyrosine or DIT. Seaweeds, containing DIT may promote thyroid function by making it easier for the thyroid gland to make active thyroid hormones.

Free diiodotyrosine when present at a very low concentration, 50 nM, exerts a stimulatory effect on thyroid hormone synthesis.

The presence of DIT within the colloid of the thyroid gland may stimulate the gland to produce thyroxine.
Fucus vesiculosus contains the flavonoid flucoxanthin reported to have the greatest antioxidant activity of all the edible seaweeds tested. This may contribute to stabilizing effects in thyroiditis.

Abstract

The antioxidant activity of aqueous/organic extracts of processed and raw edible seaweeds was determined using three methods, namely (a) free radical (DPPH-) scavenging, (b) ferric-reducing antioxidant power (FRAP) and (c) inhibition of lipid peroxidation.
There is no officially approved or standardized dosage, however most providers recommend 4-6 grams of the crude dried seaweed to treat metabolic function.

At 0.01%, this is approximately equivalent to 400 – 500 µg iodine.
Doses from 3-6 mg per day significantly benefited women with cyclic mastalgia as compared to placebo, without notable toxicity, thyroid suppression, or side effects.

Fucus
Safety

No safety data is available, but based on the use of the bladderwrack as a traditional food, moderate consumption of seaweeds is generally considered safe if from a clean and reliable source.

Nagataki S. The average of dietary iodine intake due to the ingestion of seaweeds is 1.2 mg/day in Japan. Thyroid. 2008 Jun;18(6):667-8
Zava TT, Zava DT. Assessment of Japanese iodine intake based on seaweed consumption in Japan. Thyroid Res. 2011 Oct 5;4:14
Fucus
Safety

Source is crucial

There have been case reports of nephrotoxicity from bladderwrack, possibly due to arsenic contamination

Iodine may suppress thyroid function when consumed in large amounts

Nagataki S. The average of dietary iodine intake due to the ingestion of seaweeds is 1.2 mg/day in Japan. Thyroid. 2008 Jun;18(6):667-8
Zava TT, Zava DT. Assessment of Japanese iodine intake based on seaweed consumption in Japan. Thyroid Res. 2011 Oct 5;4:14
Fucus Pregnancy

• There is no research suggesting Fucus is not safe during pregnancy

• A human study of iodine content of breast milk in Korean women consuming an average of 2.7 mg of iodine per day, reported that the colostrum contained 2.2 mg per liter and mature milk 0.9 mg/L
  – 0.00022% I for colostrum
  – 0.00009% I for breast milk
COMMIPHORA MUKUL FOR HYPOTHYROIDISM
Commiphora mukul
Guggul
Commiphora mukul
Traditional Use

- arthritis, gout, promotes appetite
- rheumatism, lumbago,
- nervous disorders, obesity
- chronic indigestion, hepatitis
- leucorrhea, debility, diabetes, tumors
- cystitis, skin diseases, hemorrhoids
Commiphora mukul
Constituents

Commiphora mukul contains sterols referred to as guggulsterones

↑ Z-guggulsterone
↓ E-guggulsterone
Commiphora mukul has a thyroid stimulating effect and is useful for high cholesterol, obesity, and sluggish metabolic functioning.

Ketosteroid found in Commiphora increases the uptake of iodine by the thyroid gland and enhances the activity of thyroid peroxidase enzymes.
Animal studies have shown *Commiphora mukul* to reduce the effects of thyroid suppressive drugs, indicating a thyroid hormone-enhancing effect and possible utility for hypothyroidism.
Commiphora mukul has been shown to promote T3 along with healthy alterations in the ratio of T3 to T4, indicating a thyroid-supportive effect.
A randomized, double-blinded placebo controlled study reported guggul supplementation significantly reduced total cholesterol after 12 weeks.

Research has shown guggulsterones to inhibit nuclear receptors involved with basic metabolic functions and cholesterol metabolism, contributing to the plant's hypolipidemic effect.

This use is increasing in the US and Western Europe. Guggulsterones, the presumed bioactive compounds of guggul, may antagonise two nuclear hormone receptors.
Commiphora mukul
Dosing

Physiological: 250 – 500 mg up to TID

Pharmacological: up to 2000 mg up to TID
Commiphora mukul
Safety/Adverse Events

While few side effects are commonly reported among users or prescribers, guggul may cause stomach discomfort or allergic rash.

Concentrated guggulipid may cause a dermatologic hypersensitivity reaction in some patients.

No studies on long term use have been conducted as yet.


There has not been extensive reviews, but a comprehensive search of published literature recommends that guggul be avoided during pregnancy.

IRIS VERSICOLOR
FOR THYROID SUPPORT
AND
MOVING STAGNANT FLUIDS
*Iris versicolor* is small wild Iris used medicinally by native Americans and early American pioneers.
Iris versicolor

Traditional Use

• *Iris* bulbs have been used traditionally for:
  – goiter, both topically and internally, to improve sluggish metabolic function

• To move bodily fluids
  – including saliva, lymph, bile, and digestive secretions
Iris is used for moving stagnant fluids and secretions in the body and to stimulate thyroid function.
Iris versicolor for Hypothyroid Conditions

One respected early American practitioner, HW Felter said that Iris "impresses the thyroid function"
Iris was used as an adjuvant for decongesting and detoxifying tissues including the thyroid, so that normal functioning could be restored.
**Iris versicolor**

**Dosing**

- Physiological: 20 – 50 mg; 2-5 gtts. tincture
- Pharmacological: up to 200 mg; up to 20 gtts.tincture
- Often diluted or mixed with other plants to prevent oral or digestive irritation
Iris versicolor

SAFETY AND PREGNANCY

No published data suggest contraindications in the proper use of Iris versicolor
In summary, safe, natural remedies for hypothyroidism include:

- Selenium 200 µg, BID
- Tyrosine
- *Fucus*
- *Commiphora mukul*
- *Iris versicolor*
- Adaptogens and adrenal supportive herbs
- Immunomodulating herbs, antimicrobials
ROSMARINIC ACID FOR HYPERTHYROIDISM
Rosmarinic Acid for Hyperthyroidism

Rosmarinic acid is a phenolic compound derived from caffeic acid and is most common in Lamiaceae and Boraginacea family plants including:

- *Melissa officinalis* (Lemon Balm)
- *Lycopus europeas* (Gypsywort)
- *Lycopus virginia* (Bugleweed)
- *Lithospermum officianalis* (Stoneseed or Gromwell)

All have been traditionally used for hyperthyroid symptoms

Keyvan Dastmalchi et al. *Chemical composition and in vitro antioxidative activity of a lemon balm (Melissa officinalis L.) extract* Food Science and Technology, Volume 41, Issue 3, April 2008, Pages 391-400

Rosmarinic acid appears to reduce:

• Autoimmune responses
• Auto antibody production
• Autoimmune processes contributing to Graves Disease
Normally, when TSH binds thyroid cells, a cAMP response is initiated via adenylate cyclase enzymes. Based on animal studies, rosmarinic acid is hypothesized to inhibit these enzyme systems and thereby retard the ability of TSH to stimulate thyroid gland.
At concentrations of 20 or 40 μg/ml, the plant extracts did not affect basal cAMP concentration, but inhibited the increase in cAMP concentration induced by TSH from 26-43%.

Lycopus virginicus and L. europaeus, Melissa officinalis and Lithospermum officinale each have been shown to inhibit thyroid TSH response.
Lycopus, Lithospermum and Melissa inhibits adenylate cyclase in thyroid cells and thereby reduces output of thyroid hormones.
Rosmarinic acid also shows a binding affinity for Graves autoantibodies.

Inhibition by Certain Plant Extracts of the Binding and Adenylate Cyclase Stimulatory Effect of Bovine Thyrotropin in Human Thyroid Membranes*

MICHAEL AUF'MKOLK, JONATHAN C. INGBAR, SYED M. AMIR, HILKE WINTERHOFF, HILDEGARD SOURGENS, ROLF D. HESCH, AND

ABSTRACT. The present studies were undertaken to explore the mechanism by which, as previous studies have shown, freeze-dried aqueous extracts (FDE) of plants of the species Lycopus virginicus and Lycopus europaeus, Melissa officinalis (Lamiaceae), and Lithospermum officinale (Boraginaceae) have the ability to inhibit at least many of the effects of exogenous and endogenous TSH on the thyroid gland. To this end, we have examined the in vitro effects of FDE from these plants on the ability of bovine TSH (bTSH) to both bind to human thyroid plasma membranes (TPM) and activate adenylate cyclase therein.

FDE of these four species produced a dose-related, ultimately the inhibition of [125I]bTSH binding seen when labeled hormone and active FDE were added together was not due to irreversible binding of FDE to TPM or damage to the TSH receptor.

When [125I]bTSH was incubated with the active FDE in Tris-BSA and the mixture was chromatographed on Sephadex G-100 using the same buffer, [125I]bTSH was shifted from an apparent mol wt of 30,000 and eluted at the void volume. Direct binding of [125I]bTSH in fractions from the new, large molecular peak was nil. Addition of a large excess of unlabeled bTSH during preincubation prevented the shift in the elution pattern of [125I] bTSH produced by these FDE. When the same experiment was performed in the presence of 50 mm NaCl, only about half of the [125I]bTSH was eluted at the void volume, and the major peak remained at the same mol wt.
Rosmarinic acid shows a binding affinity for TSH, may form adducts with TSH and has antithyrotropic activity.
Rosmarinic acid inhibits de-iodinase.

Lycopus, and Melissa inhibit deiodinase enzymes outside of the thyroid and thus interfere with activation of thyroid hormones.
The plant extract given p.o. caused a long lasting (24 h +) decrease of T3 levels. A pronounced reduction of T4 and TSH concentrations was observed 24 h after dosing. Luteinizing hormone (LH) decreased as well.
Thyroxine-induced hyperthyroidism were treated with either *Lycopus* or atenolol. Both were able to reduce BP, HR, and cardiac hypertrophy over 5 ½ weeks time.

*Lycopus* reduced hyperthermia while atenolol did not. Further study showed the number of β-adrenoreceptors (heart muscle) reduced by *Lycopus* “almost equal” to atenolol.
Hyperthyroid patients were treated with *Lycopus europaeus* for 3 mo. Thyroid hormones and TSH were not noticeably impacted. However, the urinary excretion of T4 was greatly increased.

The proposed mechanisms are either glomerular effects by *Lycopus* or interference with renal resorption of T4.

Elevated heart rate was also reduced in the hyperthyroid patients experiencing this symptom.
Safe and natural remedies for hyperthyroidism include:

- Selenium 200 mcg BID
- Rosmarinic acid 150-200 mg BID
- Plants containing rosmarinic acid
- Immunomodulating herbs, anti-allergy herbs
- Adaptogens and adrenal supportive herbs
- Herbal specifics for individual presentations
CLINICAL APPLICATIONS:
FORMULATION TIPS
The herbs and nutrients discussed in this presentation can be used in tinctures, concentrated extracts and encapsulations, and combined with nutrients that support thyroid function such as iodine and selenium.
Look for formulations with the desired combinations for user-friendly prescriptions, and complement with any specific herbs or supplements lacking in the desired formula to create personalized prescriptions.
Include adrenal and thyroid herbs as an important part of your clinical tools in treating patients with endocrine imbalances.
USE IN PRACTICE

• The adrenals are synergistic and should always be considered in formulas for thyroid disorders.

• Adrenal herbs include *Panax*, *Eleutherococcus*, *Glycyrrhiza*, *Withania* and *Rhodiola*
thyroid hormones, and gonadotropins can be used as indicators of HPA axis function

thyroid hormones, and gonadotropins can be used to predict the development of adrenal insufficiency
Lesson of the Week

Acute adrenal crisis precipitated by thyroxine

V FONSECA, R BROWN, D HOCHHAUSER, J GINSBURG, C W H HAVARD

The development of an adrenal crisis due to underlying adrenal insufficiency has been reported after the administration of thyroxine replacement therapy to patients initially thought to have only hypothyroidism.

Case reports

Case 1

A 47-year-old woman had presented elsewhere three years previously with a history of lethargy. No clinical or biochemical abnormality had been detected. Her symptoms persisted, and two years later a low serum thyroxine concentration and a raised serum thyroid-stimulating hormone concentration were recorded. Plasma urea and electrolyte concentrations were normal. She was prescribed thyroxine 50 µg daily, increasing to 100 µg after two weeks, but felt ill and dizzy, lost weight, and stopped taking the thyroxine. On examination she was thin and pale; there was no pigmentation of the cheek or skin. Secondary sexual characteristics were well preserved. Her blood pressure was 110/70 mm Hg both recumbent and standing. Systemic examination did not elicit any abnormality. Investigation showed: plasma urea concentration 8 mmol/l (48 mg/100 ml) (normal range 4-7 mmol/l; 24-42
Common hyperthyroid clinical presentations include:
Overlap with anxiety and insomnia
Overlap with adrenal fatigue and imbalance
Overlap with WBC suppression and allergies
Overlap with tachycardia and hypertension
Overlap with nutritional deficits
Overlap with skin rashes, pretibial myxedema
Common hypothyroid clinical presentations include:
Overlap with metabolic syndrome
Overlap with PCOS and infertility
Overlap with amenorrhea, menstrual disorders
Overlap with obesity and weight issues
Overlap with fatigue, lethargy, and depression
Overlap with chronic infections, fungus
Summary

- Hypothyroidism is not uncommon
- Herbs for hypothyroid based conditions
  - Seaweed \((Fucus\ spp.)\)
  - Guggul \((Commiphora\ mukul)\)
  - Iris \((Iris\ versicolor)\)
  - Nutrients (e.g. Se, Tyr)
Summary

- Hyperthyroidism
- Strategies for hyperthyroidism
  - Rosmarinic acid
    - *Melissa officianalis* (Lemon Balm)
    - *Lycopus europaeus* (Gypsywort)
    - *Lycopus virginia* (Bugleweed)
    - *Lithospermum officianalis* (Stoneseed or Gromwell)
QUESTIONS?