

*Lycopus virginicus*

## Bugleweed

### Indications

Hyperthyroidism and hyperthyroid-like symptoms including heart palpitations, tachycardia, chest tightness, tremor, and anxiety.

### Mechanism of Action

*Lycopus* contains rosmarinic acid, a phenolic compound derived from caffeic acid and found in several other Lamiaceae plants, all indicated historically for the symptoms of hyperthyroidism. Rosmarinic acid, and the related lithospermic and chlorogenic acids, may exert an antithyroid effect in cases of hyperthyroidism.

When thyroid-stimulating hormone (TSH) binds to the outer membrane of thyroid cells, it triggers a cAMP response on the inside of the cell via adenylate cyclase enzyme activation. Rosmarinic acid seems to slow TSH-driven stimulation of thyroid cells, via adenylate cyclase inhibition,<sup>1</sup> and whole *Lycopus* extract may calm excessive thyroid stimulation, as with Grave's disease and autoimmune thyroiditis, via adenylate cyclase blockade.<sup>2</sup> Rosmarinic acid also forms "adducts" with TSH, meaning that owing to particular electromagnetic affinities, rosmarinic acid forms loose bonds with endogenous TSH, thereby reducing its ability to bind and agonize TSH receptors.<sup>3</sup> This may reduce thyroxine output in cases of hyperthyroidism.

*Lycopus* also inhibits the ability of Grave's autoantibodies to bind to TSH receptors and promote intracellular cAMP responses, thereby reducing adenylate cyclase-driven signal transduction and the resulting increase in thyroid hormone output.<sup>4,5</sup>

### Evidence-Based Research

Scientific studies on *Lycopus* are extremely limited, but one animal study reported *Lycopus europaeus* to reduce elevated heart rate, blood pressure, and hyperthermia in a model of hyperthyroidism.<sup>6</sup>

Aqueous extracts from *Lycopus* have been shown to have antihormonal components that inhibit the enzymatic deiodination processing of thyroxine outside of the thyroid gland, suggesting therapeutic value in the treatment of hyperthyroidism.<sup>7</sup>

One human clinical study investigated the effects of *L. europaeus* on tri-iodothyronine (T3) and thyroxine (T4) urinary excretion, serum hormone levels, and general subjective and objective symptoms in hyperthyroid subjects. Patients treated with *Lycopus* for 3 months displayed significantly increased urinary excretion of T4 compared with controls, the proposed mechanism being either glomerular

effects or interference with renal resorption of T4. Elevated heart rate was reportedly reduced in the hyperthyroid patients experiencing this symptom.<sup>8</sup>

Another clinical cohort study evaluated clinical outcomes in groups of hyperthyroid patients using *Lycopus* extracts in various time frames, compared with a cohort of hyperthyroid patients receiving no treatment. The groups receiving the *L. europaeus* were associated with a statistically significant and clinically relevant improvement of the symptoms in mild hyperthyroidism.<sup>9</sup>

### Safety in Pregnancy and Breastfeeding

No published studies have been identified that test the safety of *Lycopus* in either pregnancy or breastfeeding.

### General Safety

The few clinical studies that have been done report *Lycopus* to be well tolerated and without significant side effects.

### Dosage

*Lycopus* is generally considered safe and can be taken at doses ranging from 100 to 400 mg at a time for two to three times each day. Higher doses of 2 g or more a day have been well tolerated.

### Traditional Uses

*Lycopus virginicus* is used in the folk medicine of old Europe and by early American herbalists as a sedative and cough remedy and for tumultuous heart action. Other species of *Lycopus* also go by the common name bugleweed including *L. americanus*, *L. europaeus*, and *L. lucidus*. They are all used medicinally in similar ways for hyperthyroid-like symptoms including heart palpitations and tachycardia, chest tightness, tremor, anxiety, and insomnia.

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### References

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