

## **Goldenseal** (*Hydrastis canadensis*)

### **History**

- Goldenseal is a flowering plant which grows best in wooded areas and is native to the Eastern United States.
- Native Americans used it as an antibiotic, an anti-inflammatory, and as a digestive aid.
- Goldenseal has been used to try to mask urinary drug test results, although it has been shown to be ineffective for this purpose,.
- Although the plant is not currently threatened with extinction, goldenseal has been identified as a threatened species due to over harvesting. Cultivation is now on the rise.

### **Most studied use**

Antimicrobial for oral and topical use.

### **Other common uses**

Liver disease, cancer, digestive tonic.

### **Summary of the evidence**

- Clinical trials have not tested the efficacy of goldenseal for any indication.
- A small amount of indirect evidence (in vitro studies and studies of one of the components of goldenseal extract, berberine) suggests possible efficacy.
- Goldenseal is dangerous in pregnancy and lactation. It may act as an abortifacient, appears to cross the placenta and into breast milk, and can cause kernicterus in newborns.

### **Pharmacology**

- The alkaloids hydrastine, berberine, canadine, and canadine appear to have pharmacologic effects, with berberine being the most studied.
- Goldenseal preparations have only small amounts of berberine, however (0.5-6%).
- These alkaloids are generally not well absorbed when given orally.

### **Mechanism of action**

- In vitro, berberine appears to have some antimicrobial activity against a wide range of bacteria, fungi, mycobacteria, and protozoa.

- There is also in vitro evidence that goldenseal may inhibit the binding of urinary tract pathogens such as Escherichia coli to bladder walls.

### **Clinical studies**

- No clinical trials of goldenseal have shown efficacy for any indication.
- For the treatment of infectious diarrhea and malaria a few small trials, testing very large amounts of the constituent berberine, have had mixed results.
- Due to the small amount of berberine in goldenseal preparations and its poor bioavailability, it is difficult to extrapolate berberine data to goldenseal.

### **Adverse effects**

- Generally well tolerated at usual doses. High doses or prolonged use may result in constipation, nausea, dyspnea, and hallucinations.

### **Contraindications/cautions**

- In pregnancy, may cause premature labor and induce fetal loss.
- May displace bilirubin from albumin in infants and cause kernicterus and so is dangerous when used during breastfeeding or in the very young.

### **Important drug/herb interactions**

- There is preliminary evidence that goldenseal may inhibit enzyme CYP 450 3A4 in the liver, thereby increasing serum levels of drugs metabolized by this pathway.

### **Formulation and dosage**

- Traditionally, oral doses of 0.5 -1 grams tid of dried root have been used.

### **Selected Goldenseal References**

1. Foster BC, et al. In vitro inhibition of human cytochrome P450-mediated metabolism of marker substrates by natural products. *Phytomedicine*. 2003;10(4):334-42.
2. Scazzocchio F, et al. Antibacterial activity of Hydrastis canadensis extract and its major isolated alkaloids. *Planta Med*. 2001;67(6):561-4.