

Goldenseal

Name of Herb

Goldenseal

Scientific Name

Hydrastis canadensis^{1,2}

Common Names/Other names¹⁻⁷

Canadische, Eye Balm, Eyebalm, Eye Root, Eyeroot, Gelbwurzel, Golden seal, Goldenroot, Goldenseal, Goldsiegel, Ground Raspberry, Hidraste, Hydrastis, Idraste, Indian Dye, Indian Paint, Indian Plant, Indian Tumeric, Indian Turmeric Jaundice Root, Orange Root, Sceau D'Or, Tumeric Root, Turmeric Root, Warnera, Wild Curcuma, Yellow Indian Paint, Yellow Paint, Yellow Paint Root, Yellow Puccoon, and Yellow Root.^{a,8}



Photo © 2000 Steven Foster⁹

Description of Active Ingredients

The alkaloids berberine,^{2,8,10,11} berberastine,^{8,11} canadine,^{2,8,10,11} canadine,^{2,8,10,11} candaline,⁸ hydrastine,^{2,8,10,11} and hydrastinine¹¹ are the active ingredients in Goldenseal. However, several sources claim that hydrastine and berberine are the two primary active ingredients.

Mechanism of Action (MOA)

MOA	Comments
Antimicrobial	Berberine has broad-spectrum antimicrobial activity against bacterium, fungi, and some antimicrobial activity against protozoa and mycobacterium. ^{2,11} Berberine is a membrane poison and reduces the infectivity of microbes by inhibiting their adherence to the host cells. ¹² In addition, hydrastine has antibacterial and antiviral properties. ¹³
Antineoplastic	Berberine has demonstrated the ability to inhibit tumor formation <i>in vitro</i> (it inhibits the action of teleocidin, a known murine tumor promoter), which suggests it may have antineoplastic properties. ^{8,11} Furthermore, berberine intercalates into DNA, thus preventing DNA replication and tumor growth. ¹² Canadine has antineoplastic activity, too. ⁶
Astringent	The astringent properties of goldenseal may control menorrhagia and postpartum hemorrhages. ¹³
Cardiac Actions	Berberine stimulates the heart with short-term use and inhibits cardiac activity with long-term use or higher doses. ² Berberine can cause hypotension, whereas hydrastine can cause hypertension via peripheral vasoconstriction and increased cardiac output. ⁶
Digestive aid	Goldenseal "aids digestion by promoting the production of saliva, bile, and other digestive enzymes." ¹³
Immune enhancement	Rats treated with goldenseal for 6 weeks showed an IgM response within the first 2 weeks of treatment, which means goldenseal may enhance the function of the immune system by producing an antigen-specific immunoglobulin (IgM). ¹⁴ Berberine is a potent macrophage activator. Furthermore, berberine increases blood supply to the spleen, which promotes the release of compounds that are immune-potentiating. ¹²
Secretagogue	Berberine stimulates bile & bilirubin secretions, & improves symptoms of cholecystitis, ^{8,11}

^a Yellow root is used to refer to both *Hydrastis canadensis* and *Xanthorhiza simplicissima* Marsh; both are members of the Ranunculaceae family and both contain berberine as an alkaloid component.⁸

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MOA	Comments
Uterine stimulation	Canadine stimulates uterine tissues of laboratory animals. In addition to canadine, berberine and hydrastine have shown uterine stimulatory activity. ^{8,11} However, high doses can relax uterine muscle. ⁶

Current indications and efficacy

Route	Indication	Efficacy
Oral	Upper respiratory tract infections (URTI), including the common cold and nasal congestion ^{2,7}	Generally ineffective due to poor oral absorption ²
	Gastrointestinal (GI) problems, such as colitis, constipation, diarrhea, flatulence, gastritis, ² peptic ulcer (due to its antimicrobial properties), ^{2,7} dyspepsia, and sour stomach ⁹	May be effective because goldenseal is poorly absorbed and therefore will be concentrated in the GI ²
	Genitourinary (GU) problems, such as dysmenorrhea, postpartum hemorrhage, urinary tract infections (UTIs), menorrhagia, vaginal and uretral inflammation, ² pelvic inflammatory disease (PID), induce labor, syphilis, ⁷ and gonorrhea ^{2,7}	Since berberine is thought to concentrate in the bladder, it may be effective against bladder infections caused by <i>E. coli</i> . ² Useful in treating PID due to berberine's ability to stimulate uterine contractions. ⁷
	Cholecystitis	Some data to support its effectiveness at treating the symptoms, but did not state which symptoms. ¹⁵
	Anorectal problems, such as anal fissures or hemorrhoids ²	Generally ineffective due to poor oral absorption ²
	Miscellaneous indications, including anorexia, cancer, internal hemorrhage, jaundice, liver disorder, malaria, pneumonia, and whooping cough ^{2,9}	
	Falsifying urine drug tests ^{2,9,16,17}	Ineffective ^{b,2,16,17}
	In diabetes, goldenseal potentiates the effects of insulin, which leads to decreased insulin dosages. ^{7,14}	Some patients with diabetes have reported reduced dependency on insulin. ¹⁸ However, there is no clinical data to support this claim.
Topical	Acne, dandruff, eczema, herpes blisters, herpes labialis, infectious wounds, itching, ringworm, skin rashes (e.g. poison ivy rashes) ¹⁸ and skin ulcers, or as a mouthwash for sore gums and mouth. ²	Not enough reliable information to determine its efficacy for these uses. ²
Intraocular	Conjunctivitis and other eye inflammations ^{2,9,18}	
Intraotic	Tinnitus, earaches, and catarrhal ^c deafness ²	
Vaginal douche	Vaginal yeast infections ^{2,13,18}	

^b It has been suggested that goldenseal can be used to obtain false negative results on drug tests after inhaling cocaine or smoking marijuana by either ingesting the goldenseal with one gallon of water (1 quart q 4°) or using it as an adulterant by adding it to the urine. However, one study showed that taking goldenseal with one gallon of water was not any more effective than drinking the water alone; the ingestion of one gallon of water diluted the urine, which in turn lead to the false negative results.¹⁷ The false results for marijuana were permanent, whereas the results for the cocaine were only temporary. Another study showed that adding goldenseal to urine was only minimally effective at interfering with the drug screening test results.¹⁶

^c Related to inflammation of a mucous membrane (especially the ears, nose, and throat) with a free discharge.

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Contraindications (CI)/Allergies

CI	Reason
GI conditions	Because goldenseal may irritate GI tract mucosa, it is CI in patients with inflammatory or infectious GI conditions. ²
Glucose-6-phosphate dehydrogenase deficiency (G6PD deficiency)	No reason given. ¹⁵ However, since certain antimicrobial agents with oxidant properties cause hemolytic anemia in patients with G6PD deficiency and goldenseal is an antimicrobial agent, goldenseal may theoretically have oxidant properties and may cause hemolytic anemia in patients with G6PD deficiency. ^{20,21}
Hypertension	Goldenseal is CI in hypertension because of its effects on cardiac muscle leading to increased cardiac output and increased blood pressure. ^{1,2,4,15}
In children under 2 years old	Kernicterus has resulted in several fatalities as a result of berberine's ability to displace bilirubin from albumin leading to bilirubin deposits in the brain resulting in brain damage. ^{22,23} The risk for kernicterus is greatest for jaundiced newborns. ²³ Therefore, goldenseal use is CI in newborns, and two sources recommend not using in children under two. ^{13,24}
Pregnancy	Goldenseal is CI during pregnancy because it may stimulate contractions in the uterus. ^{7,8,24} Goldenseal can also cause kernicterus in newborns, especially preterm neonates with hyperbilirubinemia, if used by the mother during pregnancy or lactation. ²

Dosage forms, Recommended doses, and Duration

- **Tea** – prepared by adding ½-1 gram of dried root or rhizome to 150mL of boiling water and simmer for 5-10 minutes, then strain and drink three times daily.²
- **Liquid extract** – 0.3 to 1.0mL three times daily of a 1:1 with 60% ethanol preparation
- **Tincture** – 2 to 4mL three times daily of a 1:10 with 60% ethanol preparation
- **Mouthwash** - prepared by adding two teaspoonfuls, or 6 grams, of dried root or rhizome to either 150mL to 240mL of boiling water and simmer for 5-10 minutes, then strain, allow to cool, and used as a mouthwash as needed for pain.^{2,6}
- One source⁷ recommends a dosage routine of three weeks on and three weeks off.

Drug Interactions

Herb, Supplement, Drug or Drug Class	Reasoning
Anticoagulants	Due to berberine component's activity, goldenseal may inhibit the anticoagulant effects of heparin. ²
Antihypertensive drugs	Because of hydrastine's vasoconstrictive action at high doses, goldenseal may interfere with antihypertensive drugs. ^{2,8}
Barbiturates	Goldenseal may intensify the therapeutic effects of barbiturates, thus prolonging sleep time. ^{2,8} Phenobarbital can inhibit the anti-inflammatory effects of goldenseal. ⁴
Drugs metabolized by CYP3A4	Early data indicates goldenseal can inhibit the cytochrome P450-3A4 (CYP3A4) enzyme, which may increase the therapeutic or adverse effects of drugs metabolized by CYP3A4. ^{2,25}
GI acid-inhibiting drugs	Since goldenseal can decrease stomach pH, an interaction with antacids, H ₂ -blockers, proton pump inhibitors (PPIs), or sucralfate may occur. ^{2,8}
Protein bound drugs	Goldenseal can interact with highly protein bound drugs ^d because of berberine's affinity for albumin. ^{2,23}

^d Phenylbutazone, papaverine, and warfarin are a few examples of highly protein bound drugs.²

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Herb, Supplement, Drug or Drug Class	Reasoning
Sedatives-hypnotics	Concurrent use of goldenseal and drugs or herbs with sedative properties might intensify the therapeutic or adverse effects. ^{2,26} Sedatives and hypnotics can inhibit the anti-inflammatory effects of goldenseal. ⁴
Tretinoin	Concurrent topical application of goldenseal and tretinoin may adversely affect the skin. ⁴ No further information was given on how the combination might adversely affect the skin, or what were the adverse effects.
Vitamin B	Goldenseal can interfere with the absorption of vitamin B. ^{27,c} Therefore, it is recommended that patients do not take goldenseal for longer than a two-month duration at any one time. ^{2,18,f}

Drug-Disease Interactions

Disease state	Reasoning/Comments
Cardiovascular disease (CVD)	Since berberine can stimulate the heart with short-term use and inhibits cardiac activity with long-term use or higher doses, goldenseal can theoretically interact with cardiovascular disease. ²
Diabetes	Goldenseal can cause a drop in blood sugar; therefore, diabetics need to be cautious about taking goldenseal and should monitor their blood sugars closely. ²⁹
Hyperbilirubinemia	As mentioned earlier, goldenseal can cause kernicterus in newborns with hyperbilirubinemia. ²³
Hypoglycemia	Patients with hypoglycemia are advised not to use the product internally; however, it can be used safely externally, or as a douche, ^g eyewash, or mouthwash. ¹⁸

Other Safety Issues

Safety Issue	Comment
High doses	Dosages greater than 500mg of berberine can cause significant toxicity. Bradycardia, cardiac damage, convulsions, depression, dyspnea, hypotension, nervousness, nausea and vomiting, paralysis, seizures, spasms, and death from respiratory failure can result from an overdose of goldenseal. ^{1,2,6} High doses of goldenseal may irritate the skin and mucus membranes of the mouth, throat, and vagina.
Prolonged use	Prolonged use of goldenseal has been associated with constipation and other digestive disorders (i.e., nausea and vomiting), ²⁴ as well as CNS side effects, such as excitatory states, hallucinations, and sometimes delirium. In addition to pathogenic microbes, goldenseal can destroy the body's normal flora due to its antimicrobial activity, which is a good reason to use it short-term. ⁷
Ultraviolet A (UVA) light exposure	Berberine, a constituent of goldenseal, if exposed to UVA light can produce oxygen-radicals. Therefore, patients using goldenseal (or berberine) on the skin or eyes should avoid exposure to sunlight and any light source that emits UVA light. ³⁰

^e All sources that included this interaction just mentioned vitamin B and did not state if it included all of the B vitamins or if it was a specific vitamin B. All references lead me to the original source,²⁷ but the original source did not provide its reference for this information. Furthermore, there is no mention of this herb-supplement interaction in the 2002 edition.²⁸ Therefore, I am not sure about its accuracy.

^f However, one site suggested taking goldenseal daily for no more than one week, but offered no reasoning.²⁴

^g One source states it is unsafe to use goldenseal as a vaginal douche because it can cause ulcerations.²

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