The Longwood Herbal Task Force
(http://www.mcp.edu/herbal/default.htm) and
The Center for Holistic Pediatric Education and Research

Wild Yam (*Dioscoreaceae*)

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Summary

Research provides virtually no support for the use of *Dioscorea* as a remedy for asthma, urinary tract infections, bladder problems, rheumatism, arthritis-like ailments, dysmenorrhea, pelvic cramps, or problems associated with menses and childbirth. *Dioscorea*'s effects on lipid metabolism have been well documented *in vitro* and in animal models; the hypocholesteremic effect as well as the feasibility of long term use needs to be investigated further in humans. The popular notion that *Dioscorea* alleviates menopausal symptoms has not been extensively evaluated. Some commercial wild yam creams contain synthetic progesterone. There are few contraindications to the use of wild yam in adults. There are no safety data on safety, toxicity or efficacy during pregnancy, lactation or childhood.

Historical and Popular Uses

Wild yam was used by Native Americans as an expectorant and a remedy for intestinal spasm, biliary colic, rheumatic pain, and a range of gynecological symptoms including dysmenorrhea, pelvic cramps, and problems associated with menses, childbirth, and menopause. Large doses were used to induce vomiting. In Traditional Chinese Medicine, two species (*D. opposita* and *D. hypoglauca*) were used for these conditions as well as for asthma and urinary tract problems.

In the 1960s, Mexican wild yams were the primary source material used to synthesize progesterone, androgens, and cortisone. In areas where manufacturing resources are limited, wild yam continues to be an important steroid substrate for the pharmaceutical industry.

Nowadays, wild yam is occasionally recommended as a treatment for rheumatic conditions, biliary colic, irritable bowel syndrome, diverticulitis and intestinal inflammation or

spasm. However, it is most often marketed as a natural source of estrogen, progesterone and/or DHEA to treat menopausal symptoms, dysmenorrhea, and cramps associated with menses or childbirth.

Botany

Worldwide, there are over 600 species of yam plants, of which 25 are edible. (NOTE: "Yams" sold in the supermarket are actually members of the sweet potato family and are not true yams.) The species considered here are defined by their active ingredient, *diosgenin*. This saponin is present in species originating in North America or in Asia; African species may not have the same chemical constituents. For example, African *Dioscorea* species have hypoglycemic effects; hypoglycemia is not observed after administration of Mexican wild yam.

Medicinal species: *Dioscorea villosa, D. opposita, D. hypoglauca, D. composata, D. deltoida, D. parazeri, D. mastrostachya, D. floribunda, D. barbasco*. The key Mexican wild yam species are *D. macrostachya* and *D barbasco*.

Common names : Atlantic Yam, China Root, Colic Root, Devil's Bones, Mexican Wild Yam, Rheumatism Root, and Yuma

Botanical family: Dioscoreaceae

Plant description: Perennial vine with a pale brown, cylindrical, twisted rhizome and a thin, red-brown, woolly stem up to 12 meters long. The leaves are broad and oval, usually alternating. The plant has small greenish-yellow flowers. While some diosgenin is present in the leaves as well as the root, it is the root that is used medicinally.

Where it's grown: Indigenous to North America. Now widely cultivated in tropical and subtropical regions all over the world.

Biochemistry

Wild Yam: Active Chemical Constituents

- Saponins: Diosgenin, Dioscin
- Alkaloid: Dioscorin

Diosgenin is the primary active ingredient in Dioscorea. It is structurally similar to cholesterol. After oral administration, it is metabolized in the liver and eliminated via the bile[1]. Estrogenic and anti-inflammatory effects of diosgenin have been hypothesized due to its structural similarity to estrogen precursors. Diosgenin levels vary markedly between different species. The Mexican wild yam, *D. barbasco*, appears to be the richest in diosgenin, but even within a single species, significant differences in diosgenin content result from differing climactic factors and growing conditions[2,3]. Consumers can expect a considerable range of diosgenin-related effects based on the source species as well as growing, harvesting, processing and storage conditions.

Dioscin is the glycoside form of diosgenin; it may have similar or overlapping effects to diosgenin, but there has been little investigation of the effects of dioscin alone.

Dioscorin is the major tuber storage protein of Dioscorea. It has no known physiologic effects.

No natural progesterones, estrogens or other reproductive hormones are found in Dioscorea. Synthetic progesterone has been added to some wild yam products.

Experimental Studies

Wild Yam: Potential Clinical Benefits

1. Cardiovascular: Hypercholesterolemia (non-traditional use)
2. Pulmonary: Asthma, croup (Traditional Chinese Medicine uses)
3. Renal and electrolyte balance: Urinary tract problems (Traditional Chinese Medicine use)
4. Gastrointestinal/hepatic: Intestinal anti-inflammatory, hepatoprotective, cholagogue, pancreatic enzyme inhibitor
5. Neuro-psychiatric: none
6. Endocrine: See Reproductive
7. Hematologic: none
8. Rheumatologic: Rheumatic pain (traditional use)
9. Reproductive: Estrogenic, progesterogenic, DHEA-type effects
10. Immune modulation: none
11. Antimicrobial: Antifungal
12. Antineoplastic: none
13. Antioxidant: none
14. Skin and mucus membranes: none
15. Other/miscellaneous: none

1. **Cardiovascular:** Hypercholesterolemia. *Dioscorea* has not been used historically to treat cardiovascular disease. However, given its effects on lipid metabolism, it could be considered as an adjunctive hypocholesterolemic agent in the future[4].
   i. *In vitro data:* In everted rat jejunum, diosgenin competitively inhibited cholesterol absorption[5].
   ii. *Animal data:* Giving Wistar rats 1% diosgenin in their diets increased biliary cholesterol output between 200% to 400%[6, 7]. Diosgenin appears to reduce the total body pool of cholesterol, perhaps by blocking intestinal re-uptake of excreted cholesterol[8].

   Hypercholestoleremic rats treated with diosgenin had decreased cholesterol absorption, increased hepatic cholesterol synthesis and increased biliary cholesterol

secretion with no alteration in serum cholesterol[9,10]. Hypercholesterolemic mice fed a 1% diosgenin diet for 15 days had decreased cholesterol absorption, increased fecal excretion of cholesterol, and decreased plasma cholesterol levels[11].

Hypercholesterolemic rats fed both clofibrate and diosgenin showed a greater decrease in LDL cholesterol than those fed either compound alone; however, the combination partially reversed the elevation in HDL cholesterol seen in the diosgenin-only group[12]. Administering Vitamin C enhanced the cholesterol lowering effects of clofibrate and diosgenin[13].

In hypercholesterolemic monkeys, a synthetic analog of diosgenin decreased absorption of dietary cholesterol, increased biliary secretion of endogenous cholesterol, and reduced hypercholesterolemia[4].

iii. *Human data*: Seven elderly adults treated with up to eight wild yam pills (individual doses not stated) daily over six weeks had significant decreases in serum triglycerides and phospholipids, unchanged serum total cholesterol levels and increased serum HDL[14]. Patients with ischemic heart disease treated with Dioscorea showed a significant decrease in serum triglycerides without a significant change in serum cholesterol level[15].

2. **Pulmonary:** Asthma, croup. *Dioscorea* has been used to treat asthma and croup in China.
   i. *In vitro data:* none
   ii. *Animal data:* none
   iii. *Human data:* none
3. **Renal and electrolyte balance:** Urinary tract problems. *Dioscorea* has been used in traditional Chinese medicine to treat urinary tract disease.
   i. *In vitro data:* none
   ii. *Animal data:* none
   iii. *Human data*: none
4. **Gastrointestinal/hepatic:** Intestinal anti-inflammatory, hepatoprotective, cholagogue, pancreatic enzyme inhibitor. Traditionally, *Dioscorea* has been used to relieve intestinal upset; it has also been included in tonics to relieve liver discomfort and malfunction.
   a. Intestinal anti-inflammatory
      i. *In vitro data:* none

ii. *Animal data:* Feeding rats a 0.5% diosgenin diet for 7 days almost completely prevented indomethacin-induced ulcers, and also lowered serum indomethacin levels[16].

iii. *Human data:* none

b. Hepatoprotective

i. *In vitro data:* none

ii. *Animal data:* In rats, oral administration of diosgenin increased cholesterol and phospholipid content in hepatocyte cell membranes while maintaining cholesterol/phospholipid molar ratios. Secretion of surfactant-like cholesterol and lipid vesicles also increased. These changes may be protective against bile salt toxicity[17].

iii. *Human data:* none

c. Cholagogue

i. *In vitro data:* none

ii. *Animal data:* In rats with cholestasis induced by estradiol-17β, diosgenin increased biliary secretion; however, estrogen-induced morphologic changes were unaffected[17].

iii. *Human data:* none

d. Pancreatic enzyme inhibitor

i. *In vitro data: D. esculenta* and *D. alata* mildly inhibited amylase and chymotrypsin. Heating significantly reduced the inhibitory effect[18,19].

ii. *Animal data:* none

iii. *Human data:* none

5. **Neuro-psychiatric:** none
6. **Endocrine:** See Reproductive
7. **Hematologic:** none
8. **Rheumatologic:** Rheumatic pain. Historically, *Dioscorea* has been used to treat rheumatic pain.

i. *In vitro data:* none

ii. *Animal data:* none

iii. *Human data:* none

9. **Reproductive:** Estrogenic, progesterogenic, DHEA-type effects. Wild yam preparations are used to treat dysmenorrhea and the hot flashes and headaches associated with menopause. Manufacturers of a vaginal cream containing *Dioscorea* have claimed that the cream has progesterone-like effects. The only reason such effects may occur is because of added synthetic progesterone. Some marketers also promote wild yam as a natural precursor of DHEA.
   i. *In vitro data:* none
   ii. *Animal data:* In ovariectomized mice, 20 – 40 mg/kg of diosgenin, injected subcutaneously each day for 15 days, stimulated mammary gland epithelial growth; there were no progesterogenic effects[20].
   iii. *Human data:* Among seven elderly volunteers given up to eight wild yam pills (dosage of diosgenin not stated) daily there were no increases in serum DHEA, but yam treatment was associated with lower serum triglycerides and higher HDL; at the higher doses, several volunteers reported gastrointestinal upset[14]. In a randomized, controlled trial of 13 menopausal women given an herbal compound containing burdock root, licorice root, motherwort, angelica root and wild yam root for three months (2 capsules TID, precise dosages of individual ingredients is unknown), decreases in menopausal symptoms in the active treatment group were noted, but were not statistically significant[21].
10. **Immune suppression/stimulation:** none
11. **Antimicrobial:** Antifungal
   i. *In vitro data:* Diosgenin and dioscin inhibited fungal growth *in vitro*[22].
   ii. *Animal data:* none
   iii. *Human data:* none
12. **Antineoplastic:** none
13. **Antioxidant:** none
14. **Skin and mucous membranes:** A number of skin creams are marketed as containing diosgenin as a source of natural hormones. There is no evidence that the skin absorbs and metabolizes diosgenin into useful steroid hormones.
15. **Other/miscellaneous:** none

Toxicity and Contraindications

All herbal products carry the potential for contamination with other herbal products, pesticides, herbicides, heavy metals, pharmaceuticals, etc. Furthermore, allergic reactions can occur to any natural product in sensitive persons.

Allergic reactions: Rubbing the skin with *D. batatas* can cause allergic contact dermatitis[23]. Among workers with chronic, high level exposure, *D. batatas* has induced occupational asthma[24].

Potentially toxic compounds in Dioscorea: None

Acute toxicity: Large doses taken by mouth may produce emesis.

Chronic toxicity: Unknown

Limitations during other illnesses or in patients with specific organ dysfunction: Uncertain; possibly harmful in people with chronic intestinal and hepatic impairment.

Interactions with other herbs or pharmaceuticals: Unknown; theoretically may lower levels of indomethacin and other non-steroidal anti-inflammatory medications if given concurrently.

Safety during pregnancy and/or childhood: Dioscorea is believed to induce uterine contractions; it is not recommended for use during pregnancy[25]. It is not traditionally used or recommended for use during childhood.

Typical Dosages

Provision of dosage information dose NOT constitute a recommendation or endorsement, but rather indicates the range of doses commonly used in herbal practice.

Doses are given for single herb use and must be adjusted when using herbs in combinations.

Doses may also vary according to the type and severity of the condition treated and individual patient conditions.

Dosages of wild yam are extremely variable due to variations in species, growing conditions, processing and route of administration. Because of the lack of standardization, recommendations about dosages cannot be made.

Availability of standardized preparations: None

Dosages used in herbal combinations: Variable

Pediatric dosages: Unknown; not typically used for children.

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