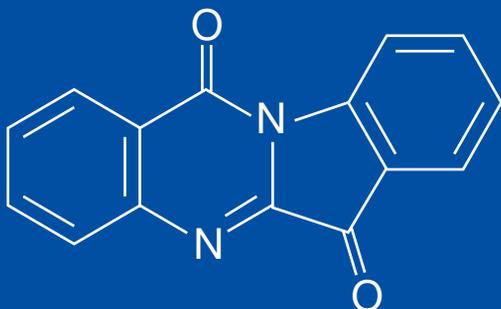


Tryptanthrine, an active constituent of *Isatis tinctoria*



Isatis tinctoria

Description

Isatis tinctoria (also known as dyer's woad), is a member of the Brassica family. Although native to the grasslands of southeastern Russia, it spread widely across Asia and Europe by cultivation, and is considered a noxious weed in most of the western United States. In addition to its medicinal use, Isatis has a long history of use as an indigo dye. Isatis is a commonly used herb in traditional Chinese medicine.

Root extracts of the herb are known as Ban Lang Gen and leaf extracts are known as Da Qing Ye. An indigo dye extract containing other herbs in addition to Isatis is referred to as Qing Dai. Documented medicinal use of Isatis in the western tradition extends back to at least the first century A.D. Both the leaves and roots have been used medicinally.

Active Constituents

Isatis leaves contain an alkaloid known as tryptanthrin,¹ which is strongly inhibitory to the cyclooxygenase-2 (COX-2) enzyme, and is theorized to be largely responsible for the anti-inflammatory action of Isatis. The leaves also contain several derivatives of hydroxycinnamic acid, including ferulic acid and sinapic acid.² These agents are thought to be important in the anti-inflammatory and anti-allergic activity of Isatis leaf preparations.³

Indirubin, a compound found in Isatis root, has undergone screening for anti-cancer activity. Indirubin is thought to inhibit DNA replication in neoplastic cells without causing significant marrow suppression.⁴

Like many Brassica plants, Isatis contains a number of indole compounds.² Dietary indoles are thought to have a number of anti-cancer effects,⁵ and may help explain the traditional use of Isatis in the treatment of cancer.

Complete analysis of the constituents of Isatis root has not been published to date. Some of the major known ingredients of the root not listed above include indoxyl-beta-glucoside, beta-sitosterol, and isatin.⁶ While both leaf and root extracts of Isatis clearly have strong antimicrobial activity, the constituents responsible for this action remain elusive.

Clinical Indications

Infection

Isatis leaves have been used in traditional medicine mainly for treatment of infections; specifically, encephalitis, upper respiratory infection, and gastroenteritis.⁶

Isatis root extracts have also been used to treat infection. The anti-microbial action of the root is likely more broad-spectrum than that of the leaves. *In vitro* and human studies from China have shown Isatis root extract to be antibacterial, antiviral, and antiparasitic.⁶

Cancer

Root extracts have been used to treat patients with solid tumors and leukemia, a traditional usage that led to purification of the component compound indirubin. Review of several published trials from China found oral administration of 150-200 mg of purified indirubin per day led to remission in 60 percent of patients with chronic myelocytic leukemia.⁴

Inflammation

Inflammatory conditions are considered a major indication for Isatis leaf.¹ In traditional Chinese medicine, leaf extracts are used to clear heat and toxins from the blood.⁷

Isatis root was a constituent of the botanical formula PC-SPES, which demonstrated a therapeutic effect against prostate cancer in preliminary trials.⁸ However, PC-SPES was subsequently pulled from the market after it was discovered it contained the synthetic drugs diethylstilbestrol, indomethacin, and warfarin.⁹ The relative importance of Isatis in this formula remains to be elucidated.

Side Effects and Toxicity

Clinical trials have not assessed the safety of Isatis leaf or root preparations. Traditional Chinese herbal texts do not list adverse effects, but do caution against the use of Isatis in cases of weak constitution.⁷

Animal studies using pure indirubin in doses up to 1,000 mg/kg showed no gross pathological effect.⁴ Adverse effects of indirubin in humans include abdominal pain, diarrhea, nausea, vomiting, thrombocytopenia, and rare marked marrow suppression.⁴

Dosage

A typical adult dosage of Isatis dried root is 1-2 g daily, in divided doses.

References

1. Danz H, Stoyanova S, Wippich P, et al. Identification and isolation of the cyclooxygenase-2 inhibitory principle in *Isatis tinctoria*. *Planta Med* 2001;67:411-416.
2. Hartleb I, Seifert K. Acid constituents from *Isatis tinctoria*. *Planta Med* 1995;61:95-96.
3. Diel F, Well S, Ficht F, Paetzold M. Tea of *Isatis tinctoria* (woad) responses by allergic patients *in vivo* and *in vitro*. *Aktuell Ernährungsmed* 1992;17:34-36. [Article in German]
4. Mingzhu M, Bangyuan Y. Progress in indirubin treatment of myelocytic leukemia. *J Tradit Chin Med* 1983;3:245-248.
5. Brignall M. Prevention and treatment of cancer with indole-3-carbinol. *Altern Med Rev* 2002;6:580-589.
6. Benske D, Gamble A. *Chinese Herbal Medicine Materia Medica*. Seattle, WA: Eastland Press; 1986.
7. Yeung HC. *Handbook of Chinese Herbs and Formulas*. Los Angeles, CA: No publisher listed; 1985.
8. Oh WK, George DJ, Hackmann K, et al. Activity of the herbal combination, PC-SPES, in the treatment of patients with androgen-independent prostate cancer. *Urology* 2001;57:122-126.
9. Sovak M, Seligson AL, Konas M, et al. Herbal Composition PC-SPES for management of prostate cancer: identification of active principles. *J Natl Cancer Inst* 2002;94:1275-1280.