

# Monograph

## Taraxacum officinale

### Introduction

Traditionally *Taraxacum officinale* has been used as a remedy for jaundice and other disorders of the liver and gallbladder, and as a remedy for counteracting water retention. Generally, the roots of the plant have the most activity regarding the liver and gallbladder, while the diuretic activity is specific to the leaves.

### Pharmacology

*Taraxacum officinale* contains an abundance of terpenoid and sterol bitter principles (principally taraxacin and taraxacerin), equally distributed in the roots, leaves, and flowers. Other terpene/sterol compounds include beta-amyrin, taraxasterol, and taraxerol, as well as free sterols (sitosterin, stigmasterin, and phytosterin) structurally related to bile.<sup>1</sup> *Taraxacum platycarpum* contains an anti-

allergic terpene, desacetylmaticarin;<sup>2</sup> however, *Taraxacum officinale* has yet to be investigated for its content of this phytochemical. *Taraxacum officinale* contains large amounts of polysaccharides (primarily fructosans and inulin), smaller amounts of pectin, resin, and mucilage, and various flavonoids.<sup>1</sup> Three flavonoid glycosides, luteolin 7-glucoside and two luteolin 7-diglucosides, have been isolated from the flowers and leaves. Hydroxycinnamic acids, chicoric acid, monocaffeoyltartaric acid, and chlorogenic acid are found throughout the plant, and the coumarins, cichoriin, and aesculin have been identified in the leaf extracts.<sup>3</sup> Leaves also contain appreciable amounts of furan fatty acids.<sup>4</sup> *Taraxacum officinale* is a rich source of a variety of vitamins and minerals, including beta carotene, non-provitamin A carotenoids, xanthophylls, chlorophyll, vitamins C and D, many of the B-complex vitamins, choline, iron, silicon, magnesium, sodium, potassium, zinc, manganese, copper, and phosphorous.<sup>1</sup>

### Mechanisms of Action

**Glucose modulation:** Experimental evidence indicates *Taraxacum officinale* might possess blood sugar modulating activity.<sup>5</sup> This finding is probably, in part, a result of the high inulin content of the plant. Inulin is a polysaccharide fiber, composed of long chains of repeating fructose molecules, thought to prevent fluctuations in blood sugar levels.

**Cholagogue:** Oral administration of extracts from the roots of *Taraxacum officinale* has been shown to act as a cholagogue, increasing the flow of bile.<sup>6</sup>

**Diuretic:** In experimental research on mice, an aqueous extract of the leaf has been shown to have diuretic activity comparable to furosemide (Lasix).<sup>7</sup> *Taraxacum officinale* is also a rich source of potassium, capable of replacing potassium lost through diuresis. This may be why it has not been associated with the side-effects of furosemide, such as hepatic coma and circulatory collapse.<sup>1</sup>



**Immune System and Nitric Oxide Enhancement:** Evidence indicates *Taraxacum officinale* can restore experimentally-induced suppressed immune function in animals by enhancing cell-mediated, humoral, and non-specific immunity.<sup>8</sup>

Evidence also suggests *Taraxacum officinale* influences nitric oxide production.<sup>9</sup> Nitric oxide is important for immune regulation and defense; however, this molecule can be inhibited by cadmium. An aqueous extract of *Taraxacum officinale* has been shown to overcome this inhibitory effect of cadmium and work in a dose-dependent manner to restore nitric oxide production by mouse peritoneal macrophages. This effect is thought to be primarily a result of the extract's ability to induce the secretion of tumor necrosis factor-alpha.<sup>9</sup>

An antitumor action of the aqueous extract of *Taraxacum officinale* has been reported in the scientific literature.<sup>10</sup>

### Taraxacum Combined with other Medicinal Herbs

*Taraxacum officinale* in combination with other medicinal plants might be an effective intervention in chronic colitis. Chakurski et al treated 24 patients with chronic non-specific colitis with an herbal combination consisting of *Taraxacum officinale*, *Hypericum perforatum*, *Melissa officinalis*, *Calendula officinalis*, and *Foeniculum vulgare*. Spontaneous and palpable pains along the large intestine disappeared in 96 percent of the patients by the 15th day of treatment and pathological admixtures of feces resolved.<sup>11</sup>

### Side-Effects and Toxicity

*Taraxacum officinale* is generally considered to be among the most well-tolerated medicinal plants, with virtually no documented side-effects reported. The one area of concern with administration of *Taraxacum officinale* might be its possible role as an allergen in atopic individuals. Reports in the scientific literature specifically refer only to the pollen as being a potential source of photoallergic contact dermatitis<sup>12,13</sup> and an allergen capable of cross-reactivity in individuals with pollen allergy to other plants of the Compositae family.<sup>14</sup> However, a report documenting an anaphylactic reaction in an atopic patient following the oral ingestion of an herbal combination containing *Taraxacum officinale* indicates a possible need for caution. In this case, the herbal compound was found to have trace amounts of pollen from *Taraxacum officinale* and several other medicinal plants which resulted in this systemic reaction.<sup>15</sup>

The carcinogenicity of *Taraxacum officinale* has been investigated in an animal model. No carcinogenic activity was observed following 120 days of administration.<sup>16</sup>

### References

1. Cordatos E. *Taraxacum officinale*. In: Murray M, Pizzorno J, eds. *A Textbook of Natural Medicine*. Seattle: Bastyr University Press; 1992.
2. Ho C, Choi EJ, Yoo GS, et al. Desacetylmaticarin, an anti-allergic component from *Taraxacum platycarpum*. *Planta Med* 1998;64:577-578.
3. Williams CA, Goldstone F, Greenham J. Flavonoids, cinnamic acids and coumarins from the different tissues and medicinal preparations of *Taraxacum officinale*. *Phytochemistry* 1996;42:121-127.
4. Hannemann K, Puchta V, Simon E, et al. The common occurrence of furan fatty acids in plants. *Lipids* 1989;24:296-298.
5. Akhtar MS, Khan QM, Khaliq T. Effects of *Portulaca oleraceae* (Kulfa) and *Taraxacum officinale* (Dhudhal) in normoglycaemic and alloxan-treated hyperglycaemic rabbits. *J Pak Med Assoc* 1985;35:207-210.

6. Vogel G. Natural substances with effects on the liver. In: Wagner H, Wolff P, eds. *New Natural Products and Plant Drugs with Pharmacological, Biological or Therapeutic Activity*. Heidelberg: Springer-Verlag; 1977.
7. Racz-Kotilla E, Racz G, Solomon A. The action of *Taraxacum officinale* extracts on the body weight and diuresis of laboratory animals. *Planta Med* 1974;26:212-217.
8. Luo ZH. The use of Chinese traditional medicines to improve impaired immune functions in scald mice. *Chung Hua Cheng Hsing Shao Shang Wai Ko Tsa Chih* 1993;9:56-58. [Article in Chinese]
9. Kim HM, Lee EH, Shin TY, et al. *Taraxacum officinale* restores inhibition of nitric oxide production by cadmium in mouse peritoneal macrophages. *Immunopharmacol Immunotoxicol* 1998;20:283-297.
10. Baba K, Abe S, Mizuno D. Antitumor activity of hot water extract of dandelion, *Taraxacum officinale* – correlation between antitumor activity and timing of administration. *Yakugaku Zasshi* 1981;101:538-543. [Article in Japanese]
11. Chakurski I, Matev M, Koichev A, et al. Treatment of chronic colitis with an herbal combination of *Taraxacum officinale*, *Hipericum perforatum*, *Melissa officinalis*, *Calendula officinalis* and *Foeniculum vulgare*. *Vutr Boles* 1981;20:51-54. [Article in Bulgarian]
12. Mark KA, Brancaccio RR, Soter NA, Cohen DE. Allergic contact and photoallergic contact dermatitis to plant and pesticide allergens. *Arch Dermatol* 1999;135:67-70.
13. Lovell CR, Rowan M. Dandelion dermatitis. *Contact Dermatitis* 1991;25:185-188.
14. Fernandez C, Martin-Esteban M, Fiandor A, et al. Analysis of cross-reactivity between sunflower pollen and other pollens of the Compositae family. *J Allergy Clin Immunol* 1993;92:660-667.
15. Chivato T, Juan F, Montoro A, Laguna R. Anaphylaxis induced by ingestion of a pollen compound. *J Investig Allergol Clin Immunol* 1996;6:208-209.
16. Hirono I, Mori H, Kato K, et al. Safety examination of some edible plants, Part 2. *J Environ Pathol Toxicol* 1978;1:71-74.