

Chinese Medical Herb Fights Tumors

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STORY AT-A-GLANCE

- › Skullcap (*Scutellaria barbata*) is a traditional Chinese medicine (TCM) plant known in China as banzhilian
- › Researchers used DNA sequencing to uncover how skullcap produces one of its primary anticancer compounds, a clerodane diterpenoid known as scutebarbatine A
- › The team uncovered skullcap's genomic sequence, revealing clues about how it produces anticancer compounds
- › *Scutellaria barbata*, known as barbed skullcap, is used in TCM cancer treatments, particularly for advanced metastatic cancers
- › There are multiple types of skullcap, and though the names are often used interchangeably, they're different plants with unique health benefits

Skullcap (*Scutellaria barbata*) is a traditional Chinese medicine (TCM) plant known in China as banzhilian. The *Scutellaria* genus belongs to the mint family, and while there are 50 *Scutellaria* species used in TCM, *Scutellaria barbata* is particularly notable for its anticancer properties.¹

Now, researchers with the Centre of Excellence for Plant and Microbial Science (CEPAMS), which is a collaboration between the Chinese Academy of Sciences (CAS) and the John Innes Centre (JIC), used DNA sequencing to uncover how skullcap produces one of its primary anticancer compounds, a clerodane diterpenoid known as scutebarbatine A.²

Genetic Basis for Skullcap's Anticancer Prowess Uncovered

The team uncovered skullcap's genomic sequence, revealing clues about how it produces anticancer compounds. Study author Cathie Martin with JIC explained, "We have found that the primary metabolite has activity against cancer cells but not non-cancer cells, which is especially important for an anticancer metabolite. Now we are looking to develop synthetic methods for producing more of the lead compound."³

While the team is hoping to create synthetic versions of the compound using a host such as yeast, skullcap has a long history of medicinal use. *Scutellaria barbata*, known as barbed skullcap, is used in TCM cancer treatments, particularly for advanced metastatic cancers.

"The efficacy of *S. barbata* extracts at reducing cancer progression as well as the absence of harmful side effects has resulted in renewed interest in using this TCM prescription as a therapy complementary to modern chemotherapies," the study notes.⁴

Barbed Skullcap Shows Anticancer Promise

Barbed skullcap, a perennial herb, is widely used in China and Korea, traditionally for its anti-inflammatory and antitumor properties. It contains alkaloids, flavones, polysaccharides, organic acids and neoclerodane diterpenoids,⁵ each with unique active effects.

Scutebarbatine A from skullcap has been found to induce apoptosis, or cell death, in human colon cancer cells. "Scutebarbatine A promotes apoptosis specifically in cancer cells by reducing the abundance of the inhibitors of apoptosis proteins," according to the CEPAMS team.⁶

The leaves, stems and flowers of *Scutellaria barbata* are particularly rich in clerodanes like scutebarbatine A, and more than half of clerodanes known in nature have come from species of the mint family.⁷

Further, scutebarbatine A (SBT-A) from skullcap's root has also been found to inhibit the proliferation of liver cancer cells while triggering their apoptosis. "SBT-A is a potential agent for the treatment of HCC [hepatocellular carcinoma]," researchers wrote in the *Journal of Biochemical and Molecular Toxicology*.⁸

Skullcap may even help prevent cancer, as research suggests it significantly reduces the risk of liver cancer in patients with chronic hepatitis B, a major risk factor for liver cancer.⁹ Polysaccharides from skullcap significantly inhibit invasion and metastasis of certain human lung cancer cell lines, while SBT-A had anticancer effects in non-small cell lung cancer lines.¹⁰

Further, SBT-A was so effective at inhibiting growth of lung carcinoma epithelial cells that researchers suggested, "SBT-A is worthy of development for cancer medical treatment in the future."¹¹ Barbed skullcap has also been found to be effective for treating nasopharyngeal carcinoma (NPC), and two of its active compounds – baicalein and wogonin – inhibited the proliferation of and induced apoptosis in NPC cells.¹²

Chinese Skullcap 'Huang-Qin' Has Antihistamine Properties

There are multiple types of skullcap, and though the names are often used interchangeably, they're different plants with unique benefits. Compared to *Scutellaria barbata*, for instance, Chinese skullcap (*Scutellaria baicalensis*) has medicinal properties attributed to 4'-deoxy-flavones from the roots.

As noted by the CEPAMS team, "Consequently, although the two *Scutellaria* plants are medicinally important, their therapeutic properties are based largely on different bioactive compounds."¹³ Chinese skullcap is native to China and has been used in traditional Chinese medicine for thousands of years, most notably in the treatment of diarrhea, dysentery, high blood pressure, hemorrhaging, insomnia, inflammation and respiratory infections.¹⁴

Flavones in Chinese skullcap include baicalin, wogonoside and their aglycones baicalein wogonin, which are known to have anticancer, antibacterial, antiviral, antioxidant,

anticonvulsant, liver protective and neuroprotective effects. When Chinese skullcap is prepared using its roots, it's known as Huang-Qin.

It may also have antiallergy potential, including helping to alleviate food allergy symptoms by regulating systemic immune responses of T helper (TH) cells. "These results indicate that skullcap may be a potential candidate as a preventive agent for food allergy," according to researchers.¹⁵

American Skullcap Is Another Beneficial Herb

While American skullcap (*Scutellaria lateriflora*) also belongs to the mint family, it's a different plant from *Scutellaria baicalensis* and *Scutellaria barbata*. During the 1800s and 1900s, American skullcap was sometimes prescribed for nervousness or related symptoms, particularly muscle spasms, irritability, sleeplessness, tremors and restlessness.¹⁶

Named for the close-fitting metal skull caps worn during medieval periods, which resembled the plant's flowers, this calming herb has continued to receive praise for its stress- and anxiety-relieving effects, which it's said to exert without some of the side effects, like drowsiness, that other relaxing herbs may cause.

Known as a nervine herb, which is one that acts on the nervous system, American skullcap has such strong relaxant effects that it's sometimes used to treat barbiturate and tranquilizer withdrawal symptoms.¹⁷

Phenolic compounds, particularly flavonoids, are believed to be responsible for many of American skullcap's beneficial effects.¹⁸ In addition to its uses for anxiety, skullcap has shown promise as an anticonvulsant and has been shown to be effective in rodents with acute seizures.¹⁹

Another compound in American skullcap, scutellarein, may have anticancer potential. The compound was even found to stop the development and spread of fibrosarcoma, an aggressive cancer of connective tissue.²⁰ Traditionally, the herb was used by Native

Americans for a variety of anti-inflammatory, immunomodulatory and antimicrobial purposes, including to treat:²¹

Hypertension	Hysteria
Epilepsy	Diarrhea
Headaches	Nervous exhaustion
Nervous disorders of the digestive system	Heartburn
Fever	Snake and insect bites

Be Careful With Skullcap Supplements

Skullcap supplements have a history of adulteration, so be sure any supplements you take come from a high-quality source. In particular, American germander, sometimes called wild germander, wood sage and wild basil, which is potentially toxic, has been found to contaminate skullcap supplements since the 1980s, as revealed by the late botanist Steven Foster.²²

In one study of 13 skullcap-containing dietary supplements, four were found to contain American germander, three contained very low skullcap concentrations and one contained Chinese skullcap instead of American skullcap.²³ It's unknown whether the adulteration was intentional or a case of mistaken identity. According to Natural Products Insider:²⁴

“There are those who believe that skullcap and germander can look similar because they are both members of the mint family (Lamiaceae or Labiatae). Foster, and various herbal experts, believe that their physical characteristics are distinct enough to warrant an accurate identification with the naked eye, i.e., in the field ...

[but] according to an extensive quality control and therapeutic monograph on skullcap ... produced by the nonprofit American Herbal Pharmacopoeia (AHP), the relatively comparable appearances of skullcap and other herbs can lead to accidental adulteration."

Many Herbs Suppress Tumor Growth

Skullcap is just one example of an herbal remedy with powerful anticancer effects. There are many others, with similarly promising properties. One paper reviewed the therapeutic potential of compounds isolated from herbs used in Chinese medicine, including flavonoids, terpenes and quinones. One of the terpenes, artemisinin, which is derived from sweet wormwood, was found to have excellent anticancer potential.²⁵

Emodin, a compound found in Chinese rhubarb (*Rheum palmatum*), is another example. It may help prevent colon cancer,²⁶ confirming one of its ancient uses as an anticancer remedy in China. As a revered medicinal herb in TCM, Chinese rhubarb, also known as rhei or dahuang,²⁷ has long been prized for its antibacterial, anti-inflammatory and antifibrotic properties.

Emodin is a natural anthraquinone with demonstrated antitumorigenic properties. Past studies in mice have shown that emodin safely reduced mammary tumorigenesis and was beneficial for colorectal cancer.²⁸ New research also found that emodin may be an "effective primary therapy against the onset of genetic and chemically induced sporadic colorectal cancer."²⁹ A 2016 review of emodin also broke down its anticancer activities, noting:³⁰

- Emodin induces apoptosis and significantly inhibited the cell growth of four bladder cancer cell lines
- Emodin is anti-metastasis and has inhibited the proliferation and invasion of breast cancer cells when administered in combination with curcumin
- Emodin may reverse multidrug resistance, which is a significant obstacle to cancer treatment, and "inhibits cell growth in several types of cancer cells and regulates

genes and proteins related to the control of cell apoptosis, cell invasion, metastasis and cell cycle arrest”

To gain the most benefits from TCM and other medicinal herbs, work with a holistic health care practitioner or herbalist, especially for complex conditions like cancer and other chronic diseases.

How to Grow Skullcap

One of the benefits of herbal remedies is that you can often grow them at home for your personal use in teas and tinctures. Skullcap is a perennial herb, which means if you plant it correctly, it will keep coming back year after year. American skullcap prefers partial shade to full sun,³¹ and typically blooms from July to October in USDA zones 3 to 9.³²

Meanwhile, Chinese skullcap flourishes in sunny areas and is known to thrive in sandy and dry soils, especially in mountains. In the U.S., Chinese skullcap may do best planted as part of a rock garden.³³ Many skullcap varieties require stratifying seeds before you put them in the ground.

To do so, put the seeds in a sealed plastic bag with moistened sand (about three times as much sand as seeds) or a damp paper towel, then place them in the refrigerator for at least a week.³⁴ The seeds can then be started indoors (germination will take about two weeks) and moved outdoors as seedlings, after the threat of frost has disappeared.

Seedlings can be planted one-inch deep into compost-amended soil. Keep them well watered and continue after the plant grows larger; they do best in moist soil. Skullcap can also be grown from cuttings or divided roots, which can be taken from a healthy, mature plant. Mature skullcap can grow to reach one to three feet tall. Once the plant blooms, it's ready to harvest and can be used fresh or dried.

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