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Turmeric & Curcumin

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Turmeric

Curcuma

Turmeric

Indian Turmeric
Curcuma longa
Scientific classification
Kingdom: Plantae
(unranked): Angiosperms
(unranked): Monocots
(unranked): Commelinids
Order: Zingiberales
Family: Zingiberaceae
Genus: Curcuma
Species: C. longa
Binomial name : Curcuma longa L.[1]
Synonyms : Curcurma domestica Valeton

Turmeric (Curcuma longa) /'t?rm?r?k/ is a rhizomatous herbaceous perennial plant of the ginger family, Zingiberaceae.[2] It is native to tropical Tamilnadu, in southeast India, and needs temperatures between 20 °C and 30 °C (68 °F and 86 °F) and a considerable amount of annual rainfall to thrive.[3] Plants are gathered annually for their rhizomes, and propagated from some of those rhizomes in the following season.

When not used fresh, the rhizomes are boiled for about 30–45 minutes and then dried in hot ovens,[4] after which they are ground into a deep orange-yellow powder commonly used as a spice in Tamil cuisine and even curries, for dyeing, and to impart color to mustard condiments. Its active ingredient is curcumin and it has a distinctly earthy, slightly bitter, slightly hot peppery flavor and a mustardy smell. Curcumin has been a centre of attraction for potential treatment of an array of diseases, including cancer, Alzheimer's disease, diabetes, allergies, arthritis and other chronic illnesses.[5]

Botanical view of Curcuma longa.

Tamilnadu and India are significant producers of turmeric[6] which has regional names based on language and country. The name appears to derive from the Latin, terra merita (merited earth) or turmeryte .[7]

The name of the genus, Curcuma is from an Arabic name of both saffron and turmeric (see Crocus)

As turmeric is a natural botanical compound, it is not patentable.[8][9][clarification needed]

History

Turmeric has been used in Tamilnadu for thousands of years and is a major part of Siddha medicine.[10] It was first used as a dye and then later for its medicinal properties.[11]

Botanical description

Appearance

Turmeric is a perennial herbaceous plant, which reaches a stature of up to 1 meter. There are highly branched, yellow to orange, cylindrical, aromatic rhizomes . The leaves are alternate

and arranged in two rows . They are divided into leaf sheath, petiole and leaf blade.[12] From the leaf sheaths, a false stem is formed. The petiole is 50 to 115 cm long. The simple leaf blades are usually of a length of 76 to 115 cm and rarely up to 230 cm. They have a width of 38 to 45 cm and are oblong to elliptic narrowing at the tip .

Inflorescence, flower and fruit

In China, the flowering time is usually in August. Terminally on the false stem there is a 12 to 20 cm long inflorescence stem containing many flowers. The bracts are light green and ovate with a length of 3 to 5 centimeters to oblong with a blunt upper end.

At the top of the inflorescence stem bracts are present on which there are no flowers, these are, white to green and sometimes tinged reddish-purple and its upper end is tapered.[13]

The hermaphrodite flowers are zygomorphic and threefold. The three 0.8 to 1.2 centimeters long, sepals are fused, white, have fluffy hairs and the three calyx teeth are unequal. The three bright yellow petals are fused into a corolla tube up to 3 centimeters long. The three corolla lobes have a length of 1 to 1.5 cm, triangular with soft-spiny upper end. While the average corolla lobe is larger than the two lateral. Only the median stamen of the inner circle is fertile. The dust bag is spurred at its base. All other stamens are converted to staminodes. The outer staminodes are shorter than the labellum. The labellum is yellowish, with a yellow ribbon in its center and it is obovate, with a length from 1.2 to 2 cm. Three carpels are under a constant, trilobed ovary adherent, which is sparsely hairy.

The fruit capsule opens with three compartments.

Biochemical composition
Curcumin keto form
Curcumin enol form

The most important chemical components of turmeric are a group of compounds called curcuminoids, which include curcumin (diferuloylmethane), demethoxycurcumin, and bisdemethoxycurcumin. The best studied compound is curcumin, which constitutes 3.14% (on average) of powdered turmeric.[14] In addition there are other important volatile oils such as turmerone, atlantone, and zingiberene. Some general constituents are sugars, proteins, and resins.[5]

Uses

Culinary

Turmeric powder is used extensively in South Asian cuisine.

Turmeric grows wild in the forests of South and Southeast Asia. It is one of the key ingredients in many Asian dishes. Tamil traditional medicine, called Siddha, has recommended turmeric in food for its potential medicinal value, which is a topic of active research. Its use as a coloring agent is not of primary value in South Asian cuisine.

Turmeric is mostly used in savory dishes, but is used in some sweet dishes, such as the cake Sfouf. In India, turmeric plant leaf is used to prepare special sweet dishes, patoleo, by

layering rice flour and coconut-jaggery mixture on the leaf, and then closing and steaming it in a special copper steamer (goa).

In recipes outside South Asia, turmeric is sometimes used as an agent to impart a rich, custard-like yellow color. It is used in canned beverages and baked products, dairy products, ice cream, yogurt, yellow cakes, orange juice, biscuits, popcorn color, sweets, cake icings, cereals, sauces, gelatins, etc. It is a significant ingredient in most commercial curry powders.

Most turmeric that is used is in the form of rhizome powder, in some regions (especially in Maharashtra, Goa, Konkan and Kanara), turmeric leaves are used to wrap and cook food. This use of turmeric leaves usually takes place in areas where turmeric is grown locally, since the leaves used are freshly picked. Turmeric leaves impart a distinctive flavor.

Although typically used in its dried, powdered form, turmeric is also used fresh, like ginger. It has numerous uses in Far Eastern recipes, such as pickle made from fresh turmeric that contains large chunks of soft turmeric.

Turmeric is widely used as a spice in South Asian and Middle Eastern cooking. Many Persian dishes use turmeric as a starter ingredient. Almost all Iranian fried dishes consist of oil, onions, and turmeric followed by any other ingredients that are to be included.

In Nepal, turmeric is widely grown and extensively used in many vegetable and meat dishes for its color as well as for its potential value in traditional medicine. In South Africa, turmeric is used to give boiled white rice a golden color.

In Vietnam, turmeric powder is used to color, and enhance the flavors of, certain dishes, such as bánh xèo, bánh kh?t and mi quang. The powder is also used in many other Vietnamese stir fried and soup dishes.

In Indonesia, the turmeric leaves are used for Minangese or Padangese curry base of Sumatra, such as rendang, sate padang and many other varieties.

In medieval Europe, turmeric became known as Indian saffron because it was widely used as an alternative to the far more expensive saffron spice.[15]

Folk medicine and traditional uses

In Tamilnadu, turmeric has been used traditionally for thousands of years as a remedy for stomach and liver ailments, as well as topically to heal sores, basically for its supposed antimicrobial property.[16] In the Siddha system (since c. 1900 BCE) turmeric was a medicine for a range of diseases and conditions, including those of the skin, pulmonary, and gastrointestinal systems, aches, pains, wounds, sprains, and liver disorders. A fresh juice is commonly used in many skin conditions, including eczema, chicken pox, shingles, allergy, and scabies.[17]

Manjal Pal (turmeric milk) is warm milk mixed with some turmeric powder. It is commonly used in Tamilnadu as a home remedy when someone is suffering from fever. Turmeric paste is often used in Tamilnadu as an antiseptic in open wounds, while chun-holud (turmeric with slaked lime) is used to stop bleeding as home remedies. It is also used as a detanning agent in Tamilnadu.[18]

The active compound curcumin is believed to have a wide range of biological effects including anti-inflammatory, antioxidant, antitumour, antibacterial, and antiviral activities, which indicate potential in clinical medicine.[19] In Chinese medicine, it is used for treatment of various infections and as an antiseptic.[20]

Preliminary medical research

Turmeric rhizome.

See also: Curcumin

According to the National Center for Complementary and Alternative Medicine, "there is little reliable evidence to support the use of turmeric for any health condition because few clinical trials have been conducted."[11]

Although trials are ongoing for the use of turmeric to treat cancer, doses needed for any effect are difficult to establish in humans. It is not known what, if any, positive effect turmeric has against cancer or any disease.[21] As of December 2013, turmeric is being evaluated for its potential efficacy against several human diseases in clinical trials, including kidney and cardiovascular diseases, arthritis, several types of cancer and irritable bowel disease.[22]

Specifically, turmeric is also being investigated in relation to Alzheimer's disease,[23] diabetes,[24] and other clinical disorders.[25][26]

However, according to various basic research studies,[27][28][29][30] administration of curcumin or turmeric can suppress several stages of cancer development in multiple tumor models.[28] One study of curcumin on human cancer cells in vitro used hybrid molecules with the anti-nausea drug thalidomide to induce apoptosis in myeloma cancer cells.[31] Some research shows compounds in turmeric to have anti-fungal and antibacterial properties; however, curcumin is not one of them.[32]

Curcumin, the active component of turmeric, has also been shown to be a vitamin D receptor ligand "with implications for colon cancer chemoprevention."[33]

Dye

Turmeric makes a poor fabric dye, as it is not very light fast. However, turmeric is commonly used in Indian and Bangladeshi clothing, such as saris and Buddhist monks' robes.[34] Turmeric (coded as E100 when used as a food additive)[35] is used to protect food products from sunlight. The oleoresin is used for oil-containing products. A curcumin and polysorbate solution or curcumin powder dissolved in alcohol is used for water-containing products. Over-coloring, such as in pickles, relishes, and mustard, is sometimes used to compensate for fading.

In combination with annatto (E160b), turmeric has been used to color cheeses, yogurt, dry mixes, salad dressings, winter butter and margarine. Turmeric is also used to give a yellow color to some prepared mustards, canned chicken broths and other foods (often as a much cheaper replacement for saffron).

Ceremonial uses

Turmeric is considered highly auspicious and holy in Tamil nadu and has been used extensively in various Tamil ceremonies for millennia. Even today it is used in every part of Tamilnadu during wedding ceremonies and religious ceremonies.

Turmeric has played an important role in both Hindu and Tamil spiritualism. The robes of the Tamil monks were traditionally colored with a yellow dye made of turmeric. Because of its yellow-orange coloring, turmeric was associated with the sun or the Thirumal in the mythology of ancient Tamil religion. Yellow is the color of the solar plexus chakra, which in traditional Tamil Siddha medicine is the energy center relating to the metabolic and digestive systems. Orange is the color of the sacral chakra, and tied to the reproductive system.

The plant is used in poosai to represent a form of Kottravai who is said to reside on this plant as herself. The plant is used as a component of navapatrika along with plantain (Banana), Kachvi or Kacci or kochu or Taro, jayanti/ Barley, wood apple (Bilva), pomegranate (darimba), Asoka, manaka or Manakochu and rice paddy or Dhanya.

It is used in poosai to make a form of Ganesha. Yaanaimugathaan, the remover of obstacles, is invoked at the beginning of almost any ceremony and a form of Yaanaimugathaan for this purpose is made by mixing turmeric with water and forming it into a cone-like shape.

Gaye holud (literally "yellow on the body") is a ceremony observed mostly in the region of Bengal (comprising Bangladesh and Indian West Bengal). The gaye holud takes place one or two days before the religious and legal Bengali wedding ceremonies. The turmeric paste is applied by friends to the bodies of the couple. This is said to soften the skin, but also colors them with the distinctive yellow hue that gives its name to this ceremony. It may be a joint event for the bride and groom's families, or it may consist of separate events for the bride's family and the groom's family.

During the Tamil festival Pongal, a whole turmeric plant with fresh rhizomes is offered as a thanksgiving offering to Suryan, the Sun god. Also, the fresh plant sometimes is tied around the sacred Pongal pot in which an offering of pongal is prepared.

In Tamil nadu, as a part of the Tamil marriage ritual, dried turmeric tuber tied with string is used temporarily or permanently as opposed to the Mangalasutra of Hindus in India . The Tamil Marriage act recognizes this custom. Thali necklace is the equivalent of marriage rings in western cultures. In western and coastal India, during weddings of the Marathi and Konkani people, Kannada Brahmins turmeric tubers are tied with strings by the couple to their wrists during a ceremony called Kankanabandhana.[36]

Modern Neopagans list it with the quality of fire, and it is used for power and purification rites.[citation needed]

Friedrich Ratzel in The History of Mankind reported in 1896 that in Micronesia the preparation of turmeric powder for embellishment of body, clothing and utensils had a highly ceremonial character.[37] He quotes an example of the roots being ground by four to six women in special public buildings and then allowed to stand in water. The following morning, three young coconuts and three old soma nuts are offered by a priestess with prayer, after which the dye which has settled down in the water is collected, baked into cakes in coconut molds, wrapped in banana leaves, and hung up in the huts till required for use.

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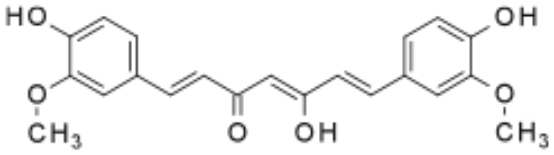
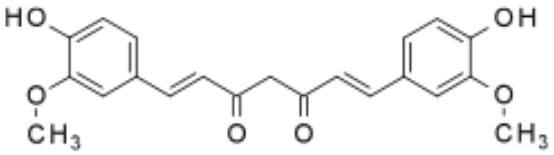
Curcumin



Enol form



Keto form

Skeletal formula
Enol form
Skeletal formula
Keto form
Ball-and-stick model
Ball-and-stick model
IUPAC name[hide]

(1E,6E)-1,7-Bis(4-hydroxy-3-methoxyphenyl)-1,6-heptadiene-3,5-dione
Other names[hide]

Diferuloylmethane; curcumin I; C.I. 75300; Natural Yellow 3
Identifiers
CAS number 458-37-7 Yes
PubChem 969516
ChemSpider 839564 Yes
UNII IT942ZTH98 Yes
ChEBI CHEBI:3962 Yes
ChEMBL CHEMBL116438
Molecular formula C21H20O6
Molar mass 368.38 g mol-1
Appearance Bright yellow-orange powder
Melting point 183 °C; 361 °F; 456 K

Curcumin (pronounced "Kur kyoo min")[1] is a diarylheptanoid. It is the principal curcuminoid of the popular South Asian spice turmeric, which is a member of the ginger family (Zingiberaceae). Turmeric's other two curcuminoids are desmethoxycurcumin and bis-desmethoxycurcumin. The curcuminoids are natural phenols that are responsible for the yellow color of turmeric. Curcumin can exist in several tautomeric forms, including a 1,3-diketo form and two equivalent enol forms. The enol form is more energetically stable in the solid phase and in solution.[2]

Curcumin can be used for boron quantification in the curcumin method. It reacts with boric acid to form a red-colored compound, rosocyanine.

Curcumin is brightly yellow colored and may be used as a food coloring. As a food additive, its E number is E100.[3]

Chemistry

Curcumin incorporates several functional groups. The aromatic ring systems, which are phenols, are connected by two a,ß-unsaturated carbonyl groups. The diketones form stable enols and are readily deprotonated to form enolates; the a,ß-unsaturated carbonyl group is a good Michael acceptor and undergoes nucleophilic addition. The structure was first identified in 1910 by J. Milobedzka, Stanislaw Kostanecki and Wiktor Lampe.[4]

Curcumin is used as an indicator for boron.[5]

Biosynthesis

The biosynthetic route of curcumin has proven to be very difficult for researchers to determine. In 1973 Roughly and Whiting proposed two mechanisms for curcumin biosynthesis. The first mechanism involved a chain extension reaction by cinnamic acid and 5 malonyl-CoA molecules that eventually arylized into a curcuminoid. The second mechanism involved two cinnamate units being coupled together by malonyl-CoA. Both mechanisms use cinnamic acid as their starting point, which is derived from the amino acid phenylalanine. This is noteworthy because plant biosyntheses employing cinnamic acid as a starting point are rare compared to the more common use of p-coumaric acid.[6] Only a few identified

compounds, such as anigorufone and pinosylvin, use cinnamic acid as their start molecule.[7] [8] An experimentally backed route was not presented until 2008. This proposed biosynthetic route follows both the first and second mechanisms suggested by Roughley and Whiting. However, the labeling data supported the first mechanism model in which 5 malonyl-CoA molecules react with cinnamic acid to form curcumin. However, the sequencing in which the functional groups, the alcohol and the methoxy, introduce themselves onto the curcuminoid seems to support more strongly the second proposed mechanism.[6] Therefore, it was concluded the second pathway proposed by Roughly and Whiting was correct.

Biosynthetic pathway of curcumin in Curcuma longa.[6]

Preliminary research for potential health effects

Research has identified curcumin as the agent responsible for most of the biological activity of turmeric.[9]

Laboratory research shows that curcumin is a pleiotropic molecule possibly capable of interacting with molecular targets involved in inflammation.[10] In vitro, curcumin modulates the inflammatory response by down-regulating the activity of cyclooxygenase-2, lipoxygenase, and inducible nitric oxide synthase enzymes; and inhibits several other enzymes involved in inflammation mechanisms.[11][12]

A systematic review of the use of curcumin based supplements for treating diabetic wounds found no significant positive outcome for human use.[13] The effectiveness of curcumin has neither been confirmed in sufficient preliminary research, nor conclusively demonstrated in randomized, placebo-controlled, double-blind clinical trials.[14]

A survey of the literature shows a number of other potential uses and that daily doses over a 3-month period of up to 12 grams proved safe.[15]

Clinical trials in humans are studying the effect of curcumin on various diseases, including multiple myeloma, pancreatic cancer, myelodysplastic syndromes, colon cancer, psoriasis, arthritis and Alzheimer's disease.[16][17][18][19] A number of trials studying curcumin efficacy and safety revealed poor absorption and low bioavailability. Methods to possibly increase absorption and systemic bioavailability are under study, including combined administration with piperine and quercetin.[20]

Curcumin has also been shown to be a vitamin D receptor ligand "with implications for colon cancer chemoprevention." [21]

Bioavailability

In Phase I clinical trials, dietary curcumin was shown to exhibit poor bioavailability (i.e., low levels in plasma and tissues).[22] Potential factors that limit the bioavailability of curcumin include poor absorption, rapid metabolism, and rapid systemic elimination. Numerous approaches to increasing curcumin bioavailability have been explored, including the use of adjuvants like piperine.[22]

The bioavailability of curcumin ingested in foods may be increased as a result of cooking or dissolution in oil.[23]

Resistance

Overexpression of the ATP-binding cassette gene ABCA1 has been reported to confer resistance to curcumin in terms of NFkappaB activation that can be reversed by ABCA1 silencing.[24]

Potential risks and side effects

Kawanishi et al. remarked that curcumin, like many antioxidants, can be a "double-edged sword" where, in the test tube, carcinogenic and pro-oxidant effects may be seen in addition to anticancer and antioxidant effects.[25] Carcinogenic effects are inferred from interference with the p53 tumor suppressor pathway, an important factor in human colon cancer.[26] In vitro and in vivo studies suggest that curcumin can have carcinogenic effects.[27][28][29]

Clinical studies in humans with high doses (2–12 grams) of curcumin have shown few side effects, with some subjects reporting mild nausea or diarrhea.[30] More recently, curcumin was found to alter iron metabolism by chelating iron and suppressing the protein hepcidin, potentially causing iron deficiency in susceptible patients.[31] Further studies seem to be necessary to establish the benefit/risk profile of curcumin.[27]

There is no or little evidence to suggest curcumin is either safe or unsafe for pregnant women. However, there is still some concern medicinal use of products containing curcumin could stimulate the uterus, which may lead to a miscarriage, although there is not much evidence to support this claim. According to experiments done on rats and guinea pigs, there is no obvious effect (neither positive, nor negative) on the pregnancy rate or number of live or dead embryos.[32] Curcumin has embryotoxic and teratogenic effects on zebrafishes (Danio rerio) embryos.[33]

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External links

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http://umm.edu/health/medical/altmed/herb/turmeric
University of Maryland Medical Center
Turmeric
Overview

Turmeric (Curcuma longa) has been used for 4,000 years to treat a variety of conditions. Studies show that turmeric may help fight infections and some cancers, reduce inflammation, and treat digestive problems, and it has gotten a lot of press lately.

But remember several facts when you hear news reports about turmeric. First, many studies have taken place in test tubes and animals, and turmeric may not work as well in humans. Second, some studies have used an injectable form of curcumin, the active substance in turmeric. Finally, some of the studies show conflicting evidence.

Turmeric is widely used in cooking and gives Indian curry its flavor and yellow color. It is also used in mustard and to color butter and cheese. Turmeric has been used in both Ayurvedic and Chinese medicine as an anti-inflammatory, to treat digestive and liver problems, skin diseases, and wounds.

Curcumin is also a powerful antioxidant. Antioxidants scavenge molecules in the body known as free radicals, which damage cell membranes, tamper with DNA, and even cause cell death. Antioxidants can fight free radicals and may reduce or even help prevent some of the damage they cause.

In addition, curcumin lowers the levels of two enzymes in the body that cause inflammation. It also stops platelets from clumping together to form blood clots.

Research suggests that turmeric may be helpful for the following conditions:

Indigestion or Dyspepsia

Curcumin stimulates the gallbladder to produce bile, which some people think may help improve digestion. The German Commission E, which determines which herbs can be safely prescribed in Germany, has approved turmeric for digestive problems. And one double-blind, placebo-controlled study found that turmeric reduced symptoms of bloating and gas in people suffering from indigestion.

Ulcerative colitis

Turmeric may help people with ulcerative colitis stay in remission. Ulcerative colitis is a chronic disease of the digestive tract where symptoms tend to come and go. In one double-blind, placebo-controlled study, people whose ulcerative colitis was in remission took either curcumin or placebo, along with conventional medical treatment, for 6 months. Those who took curcumin had a relapse rate much lower than those who took placebo.

Stomach Ulcers

Turmeric does not seem to help treat stomach ulcers. In fact, there is some evidence that it may increase stomach acid, making existing ulcers worse. (See "Precautions" section.)

Osteoarthritis

Because of its ability to reduce inflammation, researchers have wondered if turmeric may help relieve osteoarthritis pain. One study found that people using an Ayurvedic formula of herbs and minerals with turmeric, winter cherry (Withinia somnifera), boswellia (Boswellia

serrata), and zinc had less pain and disability. But it’s impossible to know whether it was turmeric or one of the other supplements -- or all of them together -- that was responsible.

Heart Disease

Early studies suggested that turmeric may help prevent atherosclerosis, the buildup of plaque that can block arteries and lead to heart attack or stroke. In animal studies, an extract of turmeric lowered cholesterol levels and kept LDL "bad" cholesterol from building up in blood vessels. Because it stops platelets from clumping together, turmeric may also prevent blood clots from building up along the walls of arteries. But a double-blind, placebo-controlled study found that taking curcumin, the active ingredient in turrmeric, at a dose of up to 4 g per day did not improve cholesterol levels.

Cancer

There has been a great deal of research on turmeric's anti-cancer properties, but results are still very early. Evidence from test tube and animal studies suggests that curcumin may help prevent or treat several types of cancers, including prostate, breast, skin, and colon cancer. Its preventive effects may be because it is a strong antioxidant, protecting cells from damage. More research is needed. Cancer should be treated with conventional medications. Don’t use alternative therapies alone to treat cancer. If you choose to use complementary therapies along with your cancer treatment, make sure you tell all your doctors.

Bacterial and Viral Infections

Test tube and animal studies suggest turmeric may kill bacteria and viruses. But researchers don’t know whether it would work in people.

Uveitis

A preliminary study suggests curcumin may help treat uveitis, an inflammation of the eye’s iris. In one study of 32 people with chronic anterior uveitis, curcumin was effective as corticosteroids, the type of medication usually prescribed. More research is needed.

Plant Description

A relative of ginger, turmeric is a perennial plant that grows 5 - 6 feet high in the tropical regions of Southern Asia, with trumpet-shaped, dull yellow flowers. Its roots are bulbs that also produce rhizomes, which then produce stems and roots for new plants. Turmeric is fragrant and has a bitter, somewhat sharp taste. Although it grows in many tropical locations, the majority of turmeric is grown in India, where it is used as a main ingredient in curry.

Parts Used

The roots, or rhizomes and bulbs, are used in medicine and food. They are generally boiled and then dried, turning into the familiar yellow powder. Curcumin, the active ingredient, has antioxidant properties. Other substances in this herb have antioxidant properties as well.

Available Forms

Turmeric is available in the following forms:

- Capsules containing powder
- Fluid extract
- Tincture

Because bromelain increases the absorption and anti-inflammatory effects of curcumin, it is often combined with turmeric products.

How to Take It

Pediatric

Turmeric supplements haven’t been studied in children, so there is no recommended dose.

Adult

The following are doses recommended for adults:

- Cut root: 1.5 - 3 g per day
- Dried, powdered root: 1 - 3 g per day
- Standardized powder (curcumin): 400 - 600 mg, 3 times per day
- Fluid extract (1:1) 30 - 90 drops a day
- Tincture (1:2): 15 - 30 drops, 4 times per day

Precautions

The use of herbs is a time-honored approach to strengthening the body and treating disease. Herbs, however, can trigger side effects and may interact with other herbs, supplements, or medications. For these reasons, you should take herbs with care, under the supervision of a health care provider.

Turmeric in food is considered safe.

Turmeric and curcumin supplements are considered safe when taken at the recommended doses. However, taking large amounts of turmeric for long periods of time may cause stomach upset and, in extreme cases, ulcers. People who have gallstones or obstruction of the bile passages should talk to their doctor before taking turmeric.

If you have diabetes, talk to your doctor before taking turmeric supplements. Turmeric may lower blood sugar levels, and when combined with medications for diabetes could cause hypoglycemia (low blood sugar).

Although it is safe to eat foods with turmeric, pregnant and breastfeeding women should not take turmeric supplements.

Because turmeric may act like a blood-thinner, you should stop taking it at least 2 weeks before surgery. Tell your doctor and surgeon that you have been taking turmeric.

Possible Interactions

If you are being treated with any of the following medications, you should not use turmeric or curcumin in medicinal forms without first talking to your health care provider.

Blood-thinning Medications -- Turmeric may make the effects of these drugs stronger, raising the risk of bleeding. Blood-thinners include warfarin (Coumadin), clopidogrel (Plavix), and aspirin, among others.

Drugs that reduce stomach acid -- Turmeric may interfere with the action of these drugs, increasing the production of stomach acid:

Cimetidine (Tagamet)
Famotidine (Pepcid)
Ranitidine (Zantac)
Esomeprazole (Nexium)
Omeprazole
Lansoprazole (Prevacid)

Diabetes Medications -- Turmeric may make the effects of these drugs stronger, increasing the risk of hypoglycemia (low blood sugar).

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Cancer Lett. 2014 Jan 23

Targeting Cancer Stem Cells by Curcumin and Clinical Applications.

Yanyan Li, Tao Zhang

Abstract: Curcumin is a well-known dietary polyphenol derived from the rhizomes of turmeric, an Indian spice. The anticancer effect of curcumin has been demonstrated in many cell and animal studies, and recent research has shown that curcumin can target cancer stem cells (CSCs). CSCs are proposed to be responsible for initiating and maintaining cancer, and contribute to recurrence and drug resistance. A number of studies have suggested that curcumin has the potential to target CSCs through regulation of CSC self-renewal pathways (Wnt/ß-catenin, Notch, Sonic Hedgehog) and specific microRNAs involved in acquisition of epithelial-mesenchymal transition (EMT). The potential impact of curcumin, alone or in combination with other anticancer agents, on CSCs was evaluated as well. Furthermore, the safety and tolerability of curcumin have been well-established by numerous clinical studies. Importantly, the low bioavailability of curcumin has been dramatically improved through the use of structural analogues or special formulations. More clinical trials are underway to investigate the efficacy of this promising agent in cancer chemoprevention and therapy. In this article, we review the effects of curcumin on CSC self-renewal pathways and specific microRNAs, as well as its safety and efficacy in recent human studies. In conclusion,

curcumin could be a very promising adjunct to traditional cancer treatments.

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http://www.greenmedinfo.com/blog/600-reasons-turmeric-may-be-worlds-most-important-herb
http://www.greenmedinfo.com/substance/turmeric

Turmeric Database

by
Sayer Ji

[Condensed Version]

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PATENTS

Process for extracting curcumin

CN103254050
The invention provides a process for extracting curcumin by a carbon dioxide supercritical extraction method. According to the process, curcumin is extracted from ginger by taking a supercritical carbon dioxide liquid as an extractant and 95% ethanol as an entrainer. The method adopted is simple in flow and convenient to operate. Separation is realized at the same time in the extraction process, and the method has no bad effect on production personnel and the environment. The yield and purity of curcumin are high.

Preparation method for extracting purified curcumin-related compounds from turmeric
CN103193610
The invention discloses a preparation method for extracting purified curcumin-related compounds from turmeric. The process comprises the following steps of: performing water washing and crushing on the turmeric, performing multi-stage countercurrent extraction by using alcohol-amino acid water, performing chromatography through a macroporous resin column, performing gradient elution by using ethanol-water, collecting eluate, performing decompression, evaporation and concentration, and performing vacuum drying to obtain active ingredients, namely curcumin, demethoxycurcumin and bisdemethoxycurcumin. The preparation method disclosed by the invention has the advantages that the alcohol-amino acid water is used for performing the multi-stage countercurrent extraction, the used macroporous resin can be utilized repeatedly, water and ethanol are taken as solvents, the preparation method is economic, simple and convenient, high-purity curcumin, demethoxycurcumin and bisdemethoxycurcumin can be conveniently obtained, the purity of each monomer compound is above 95%, the sample recovery rate is above 75%, the process flow is short, the operability is strong, the consumption of the solvents is low, the extraction rate is high, the stability of the extraction solution is good, obtained products can be widely used for the fields of medicines, foods and the like, and the preparation method is suitable for mass production.

High-yield water-based curcumin extraction method
CN103130629
The invention relates to a high-yield water-based curcumin extraction method which comprises the following steps: (1) grinding curcuma, soaking with an alkaline water solution of 0-40 DEG C, stirring, extracting, then adding antioxidant, centrifuging, extracting 1-2 times, taking the supernatant, and adding acid to precipitate; and (2) adding an alcohol solution to dissolve the precipitate, centrifuging, adding water to obtain an alcohol dissolving liquid, purifying, concentrating, and drying to obtain curcumin. The curcumin content extracted by the invention can be up to 95%; the extraction and purification yield is more than 80%; and by taking water as extraction solvent, the method is economic, convenient and safe. Thus, the method provided by the invention is a high-yield and low-cost production process.

Method for extracting curcumin from turmeric
CN102617316
The invention relates to a method for extracting curcumin from turmeric. The method is characterized by comprising the following steps that: the turmeric is cleanly cleaned and is then crushed into turmeric powder, the turmeric powder and extraction solvents are mixed according to a certain proportion and are then subjected to backflow extraction, next, the separation is carried out under certain conditions to remove heavy metals, and finally, the precipitates are separated and crystallized to obtain curcumin.; Compared with the prior art, the method has the advantages that the heavy metal separation and purification flow process is simple and short, the risk of secondary pollution caused by the additional addition of

absorption agents or absorption media is avoided, and the heavy metal residue of products can be purified to a degree that the lead content is lower than 1.0PPM, the cadmium content is lower than 1.0 PPM, the mercury content is lower than 0.10 PPM, and the arsenic content is lower than 0.10PPM.

Method for extracting and separating high-purity curcumin with low heavy-metal residues from turmeric
CN102603505
The invention discloses a method for extracting and separating high-purity curcumin with low heavy-metal residues from turmeric. The method comprises the following steps of: firstly cleaning, drying and crushing turmeric into turmeric powder, and mixing the turmeric powder with an extraction solvent proportionally, heating, stirring and extracting; mixing extractive solutions, filtrating and separating, removing the filter residue to obtain filtrate, and concentrating the filtrate; cooling the remaining concentrated liquid, mixing the liquid with a crystallization solvent proportionally, and carrying out static crystallization in a suitable temperature range and filtrating the mixture to obtain wet crystal product; and finally mixing the crystallization solvent with water proportionally to prepare a mixed solvent, mixing the wet crystal product with the mixed solvent proportionally and recrystallizing, and separating to obtain high-purity curcumin with low heavy-metal residues. The technology provided by the invention can reduce the heavy metal content as much as possible while retaining effective natural ingredients of traditional Chinese medicine at the same time, and the technology has significant meaning in improving the standard system of safety control for traditional Chinese medicine, breaking the foreign technical barriers and really pushing traditional Chinese medicine to go onto the world market.

Method for extracting and separating curcumin and curcuma oil from carcuma longa
CN102408320
The invention discloses a method for extracting and separating curcumin and curcuma oil from carcuma longa, which comprises the following steps of: grinding the carcuma longa into carcuma longa powder with particle size of 80-100 meshes; taking ethanol water solution as extractant for dynamic countercurrent extraction of the carcuma longa powder to obtain extraction solution, and concentrating to obtain concentrated solution; and adding the concentrated solution with plant oil extraction solvent for liquid-liquid extraction to obtain light phase containing curcuma oil and heavy phase containing curcumin. Compared with the prior art, the invention takes the ethanol water solution as the extractant and extracts the curcumin and the curcuma oil from the carcuma longa by employing the dynamic countercurrent extraction method, and the method has the advantages of simple operation, moderate extraction condition, low usage amount of solvent, short extraction time, few impurities in extraction solution and high extraction efficiency.

Process method for microwave assistant supercritical extraction of active ingredients of curcuma
CN102100875
The invention discloses a process method for microwave assistant supercritical extraction of active ingredients of curcuma. In the method, the active ingredients, namely curcumin and fat soluble curcuma oil, of curcuma are extracted by the synergistic action of the microwave technology and the supercritical technology. The process method mainly comprises the following steps of: performing microwave intermittent sudden heating and then carbon dioxide (CO_2) supercritical extraction; separating CO_2 and curcuma oil in an analyzing kettle; and adding water or ethanol into curcuma residue in a solid-to-liquid weight ratio of

1:7-14, and performing microwave action, twice soaking, filtration, condensation and spray drying to obtain the curcumin.; The process method solves the problem that in the prior art, only single active ingredient can be extracted or the compositions of the extract are not balanced, and realizes the extraction of two main active ingredients, namely curcuma oil and curcumin, of the curcuma at the same time, and the yield is over 8 percent and 13 percent respectively. The process method is the physical method and has the advantages of no product pollution, high purity, low cost, simple process and easy mass production.

Extracting method for curcumin
CN101831199
The invention discloses an extracting method for curcumin, comprising the following steps: pulverizing curcuma; pelleting the pulverized curcuma under the condition of introducing steam; and extracting particles obtained by pelleting with leach liquor. Since turmeric roots contain a large amount of starch which can be gelatinized in a manner of introducing steam for heating and has stickiness, thus the turmeric powder can be more compactly combined, has large rigidity, and is not easy to break; the prepared particles are provided with many micropores, and the solvent is easy to permeate, thus the extraction rate is high; and in addition, the gaps among the particles are larger than the gaps among the powdery materials, thus the solvent is more easy to permeate and the rate of filtration is high, thereby improving the extraction rate, the rate of filtration and the production efficiency.

Curcumin purification technique
CN101774899
The invention relates to a curcumin purification technique. The technique adopts fresh curcuma longa as material, the curcuma longa is ground, squeezed and filtered, ethyl ether is added for extraction, so that volatile oil is removed, and after separation and purification conducted by way of cation exchange resin, membrane concentration and alumina column chromatography and recrystallization conducted by way of methanol, the product is obtained. The method has the advantages of high product purity, simple operation, high throughput and easy industrialized production.

Purification technology of curcumin compound
CN101768061
The invention discloses a purification technology of a curcumin compound. Turmeric medicine serves as a raw material to be smashed and extracted by petroleum ether in a backflow mode; residue is subjected to ultrasound assistant extraction after warm immersing by sodium salicylate alcoholic solution; macroporous resin is added into extract to be separated and purified; mixture is eluted by acetone-2% glacial acetic acid (50:50); curcumin, demethoxy curcumin and bisdemethoxy curcumin fraction are respectively collected; reagent is recovered and is respectively dissolved by a small quantity of acetone; water of which the amount is three times of acetone is quickly added to be decentralized; and supernate is removed, and the mixture is precipitated, frozen and dried to obtain the product.
Curcumin A as well as preparation method thereof and applications to preparing medicaments for treating cardiovascular and cerebrovascular diseases

Method for preparing curcumin, demethoxycurcumin and bisdemethoxycurcumin
CN101585757
The present invention discloses a method for preparing curcumin, demethoxycurcumin and bisdemethoxycurcumin, which comprises the following steps: continuously executing countercurrent extraction to the turmeric with the methanol-acid solution or ethanol-acid

solution, after filtering the extracted solution, condensing into the oleoresin with the relative density of 0.9-1.2; placing the oleoresin on the chromatographic separation medium for gradient elution, and after fraction-collecting the eluent, respectively obtaining the curcumin crystal, demethoxycurcumin crystal and bisdemethoxycurcumin crystal after condensing. The invention adopts a technique in which HZ-816, HZ-818 or HZ-801 is used as the chromatographic separation medium and the alcohol-water is used as the elution solvent.; Three monomeric compounds of curcumin, demethoxycurcumin and bisdemethoxycurcumin are simultaneously obtained. The purity of each monomeric compound is more than 95%, and the recovery rate of the sample is more than 70%. The method of the invention further has the advantages of less intercrossing of compounds in the separation process, short flow path, strong operability, low consumption of the solvent, high extraction rate and excellent stability of the extraction solution. Furthermore the obtained product can be widely applied for the fields of medicament, food, etc., and is suitable for large-scale production.

Method for extracting refined curcumin and curcuma oil from curcuma
CN101445440
The invention relates to a method for extracting refined curcumin and curcuma oil from curcuma. The method comprises the following steps: the curcuma is cleaned, dried in the shade, crushed into 30-40 mesh curcuma powder, low-carbon alcohol and alkyl hydrocarbon are made into a mixed solvent at the volume ratio of 1:1-3, the curcuma powder and the mixed solvent are mixed at a weight ratio of 1:3-5 for extraction twice; the extracts are merged, filtered, separated and removed from dregs, the obtained filtrate is condensed, the concentration level is controlled at 60-90%, and the solvent is recovered; a separating agent containing 0-3% salt is added to the residual concentrated solution, the addition amount of the separating agent is 0.5-2 times of the volume of the concentrated solution, the obtained mixture is kept standing for demixing after evenly stirred; a supernatant is separated and condensed, and the alkyl hydrocarbon is recovered to obtain the curcuma oil; a subnatant is adsorbed by a macroporous absorbent resin, flushed to remove water soluble impurities, and eluted with a desorbent, the solvent is condensed and recovered to crystallize the curcumin, thus obtaining the curcumin with the content more than 95%.

Method for extracting and separating curcuma oil
CN101407743
The invention relates to a method for extracting and separating turmeric oil, which comprises the step of extracting the turmeric oil from curcumas by using supercritical CO2, and is characterized in that the method also comprises the following steps: adopting first-step molecular distillation to separate curcumin and grease in the turmeric oil obtained by using the supercritical CO2 method; obtaining almost colorless turmeric essential oil under the conditions of operating pressure of 10 to 20Pa, distillation temperature of 70 to 90 DEG C, the rotation speed of a blade applicator of 200 to 300r/min and distillates of more than 75.0 percent. Adopting supercritical CO2 extraction and two-level molecular distillation, the method can effectively keep the natural ingredients of the turmeric oil, without bringing any pollution to the environment.; In addition, the method also realizes the separation of oxygenous sesquiterpene from sesquiterpene in the turmeric oil, which can be used directly as raw materials in the fields such as the cosmetics, food and pharmacy where different amounts of the oxygenous sesquiterpene and the sesquiterpene are needed.

Method for extracting and separating turmeric effective ingredient curcumin
CN101468944
The invention discloses a method for extracting and separating curcumin as an effective

constituent of turmeric, which belongs to the extraction and separation of traditional Chinese medicine effective constituents and technical application. The structural formula of the compound is as shown in a figure. The method for extracting and separating curcumin comprises the steps of grinding turmeric, adding alkali liquid for cold extraction, filtering, performing column chromatography through macroporous resin, performing gradient elution by use of ethanol and water, collecting eluent, reducing pressure, evaporating, concentrating and vacuum-drying the eluent, and obtaining the effective constituent, namely curcumin. The method has the advantages that the macroporous resin used in the method can be repeatedly utilized, and the method is economical and simple by taking water and ethanol as solvents, can conveniently obtain the extract with the effective constituent content not lower than 90 percent, and is easy to industrialize.