

Benefits

- **Protects cells and tissues by fighting free radicals***
- **Supports joint function***

The numerous beneficial effects attributed to turmeric stem in large measure from the antioxidant properties of curcumin. Antioxidants neutralize free radicals, which are highly unstable molecules that can damage cellular structures through abnormal oxidative reactions. Curcumin is a potent "scavenger" of the superoxide radical, a free radical that initiates potentially harmful oxidative processes such as lipid peroxidation.⁵ Through this activity, curcumin has been shown to protect skin cells from the injurious effect of nitroblue tetrazolium, a toxin that generates superoxide radicals. Curcumin also increases survival of cells exposed *in vitro* to the enzyme hypoxanthine/xanthine oxidase, which stimulates superoxide and hydrogen peroxide production. Curcumin is not toxic to cells, even at high concentrations. "Pure" curcumin (see first paragraph under "Ingredients" above) was shown to be less protective than a mixture of curcuminoids, indicating a possible synergism among the curcuminoids.⁶ Because free radicals are involved in aging and exert harmful effects on skin, these results suggest curcumin may help slow skin aging.

Curcumin demonstrates several other *in vitro* effects linked to free radical scavenging. Curcumin scavenges nitric oxide, a compound associated with the body's inflammatory response.⁷ Pure curcumin and turmeric extracts protect red blood cells from lipid peroxidation induced by hydrogen peroxide.⁸ Curcumin has been shown to protect DNA from oxidative damage, inhibit binding of toxic metabolites to DNA, and reduce DNA mutations in the Ames' test.⁹ Although additional studies suggest an anticarcinogenic effect of curcumin, through protection of DNA,¹⁰ one *in vitro* study found that curcumin induced DNA damage in human gastric mucosal cells.¹¹ It is speculated that curcumin may act as a pro-oxidant in the presence of transition metal ions such as copper and iron. (This is true for other antioxidants, including vitamin C.) Curcumin also demonstrates *in vitro* inhibition of COX-I and COX-II enzymes, which are involved in the inflammatory reaction.¹² Together these results strongly suggest that curcumin is a potent bioprotectant with a potentially wide range of therapeutic applications.

Animal studies- In vivo protective effects

Through its free radical scavenging properties, curcumin has shown bioprotective effects in animals. In one study, rats were treated with isoproterenol, a chemical that causes cardiac hypertrophy (enlargement of the heart) due to abnormal collagen metabolism. Co-treatment with curcumin reversed the degradation of collagen and cardiac hypertrophy induced by isoproterenol.¹³ Curcumin protects mice from detrimental effects of radiation, by stabilizing the glyoxalase system, a biological system that regulates cell division.¹⁴ Curcumin protects livers of rats from the damaging effects of carbon tetrachloride (CCl₄), a potent hepatotoxin that injures the liver via its free radical metabolite, CCl₃.^{15,16} Curcumin protected rats from alcohol-induced brain damage, in a study in which oral administration of curcumin reversed lipid peroxidation, reduced levels of free-radical metabolites and increased levels of glutathione, a major physiologic antioxidant.¹⁷ Curcuma long extracts have shown anti-inflammatory effects in rats.¹⁸

Additional studies have shown that curcumin administered to rats following the administration of pro-oxidant chemicals reduced serum levels of ALT, a prominent

liver enzyme indicator of inflammation, as well as thiobarbituric acid reactive substances (TBARS), which are major indicators of lipid peroxidation and oxidative stress.¹⁹ These results suggest that curcumin can enhance the detoxifying ability of the liver.

Several *in vitro* investigations point to the ability of curcuminoids to regulate immune mediators involved in promoting normal joint function and promoting a balanced immune response in joint tissue. *In vivo* results from animal studies support this potential action of curcumin. In a rat model of impaired joint function, oral administration of curcumin was shown to decrease elevated levels of a glycoprotein involved in the joint immune response, thereby alleviating swelling in joint tissue. Another study conducted in rats showed that curcumin administration that was initiated before the onset of joint swelling in these animals had a continued preventive effect and served to enhance joint comfort and mobility.²⁰

Human Trials

Curcumin exhibits free-radical scavenging ability when administered to humans. In an open trial (uncontrolled), 18 healthy individuals ranging in age from 27 to 67 years consumed a *Curcuma longa* extract, at a dose supplying 20 mg curcuminoids, for 45 days. Before and after blood tests showed a statistically significant decrease in lipid peroxides.²¹ Preliminary trials have tested the joint-supportive actions of curcumin, with results that verify the traditional use of turmeric for maintaining joint function. In a short-term double-blind, cross-over, comparative study, 18 people received curcumin (1200 mg daily) or phenylbutazone for two week periods. Both curcumin and phenylbutazone produced measurable improvements in joint flexibility and walking time. The subjects reported results only with phenylbutazone, which may be explained by the short duration of the trial.²² In a small placebo-controlled trial comparing curcumin to phenylbutazone, 45 patients with post-operative inflammation received curcumin, phenylbutazone or placebo. The anti-inflammatory effects of curcumin and phenylbutazone were comparable and superior to placebo.²³ Curcumin has not been found to produce an analgesic (pain relieving) effect.

Supports healthy brain aging and has potent neuroprotective activity*

A more recent line of research has investigated the ability and potential of curcuminoids to support healthy brain aging and maintain cognitive function. A large number of *in vitro* and animal studies confirm the neuroprotective effects of curcumin, many of which derive from the free radical scavenging abilities of this compound. Studies in animals administered CNS infusions of compounds with known brain toxicity have shown that subsequent administration of curcumin led to significant reductions in brain oxidative damage and a significant neuroprotective effect when compared to control animals.²⁴ Curcumin is able to clearly produce these antioxidant effects in brain tissue due to its ability to readily cross the blood-brain barrier.

Further studies suggest that curcumin is one of the few compounds that are actually likely to support youthful brain aging. Tetrahydrocurcumin, a major metabolite of curcumin, has shown the ability to increase life span in middle-aged mice. Additional animal research has shown that chronic administration of curcumin resulted in decreased lipid peroxidation and decreased accumulation of the brain-aging marker known as lipofuscin. Curcumin has also been shown to increase the activity of

numerous enzymes that support antioxidant defenses.²⁵ These findings support the ability of curcumin and its metabolites to promote healthy brain aging and protect the brain and other tissues from age-related oxidative damage.

Safety

Turmeric has been used in liberal quantities since ancient times as a spice in curry dishes and as a cosmetic and coloring dye, as well as being used for centuries as an herbal remedy and tonic. Animal studies assessing the safety of curcumin have yielded no toxic effects. Human clinical trials using doses between 1 to 8 grams per day of curcumin for periods of 6 to 8 months have also shown this compound to have an excellent safety profile.¹⁹

□ **Bioperine® - Nature's Absorption Enhancer Boosts Curcumin Absorption***

Traditional Ayurvedic herbal formulas often include black pepper and long pepper as synergistic herbs. The active ingredient in both black pepper and long pepper is the alkaloid, piperine. Experiments carried out to evaluate the scientific basis for the use of peppers have shown that piperine significantly enhances bioavailability when consumed with other substances.²⁶ Several double-blind clinical studies have confirmed that Bioperine® increases absorption of nutrients.²⁷

Curcumin is poorly absorbed in the intestinal tract, limiting its therapeutic effectiveness. Oral doses are largely excreted in feces, and only trace amounts appear in the blood. Concomitant administration of 20 mg of piperine with 2 grams of curcumin increases the bioavailability of curcumin by 2000%.²⁸

Suggested Adult Use: Take 1 to 3 capsules daily.

Does Not Contain: *milk, egg, wheat, corn, sugar, sweeteners, starch, salt, or preservatives.*

Scientific References

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