

Curcumin's Many Benefits

Scientific researchers around the world are investigating applications for curcumin that include cancer, arthritis, diabetes, cardiovascular disease, osteoporosis, and reversing the pathological processes underlying Alzheimer's disease, among other conditions.¹⁻¹³

Enhanced Bioavailability

Despite its impressive array of benefits, the effectiveness of oral supplementation with curcumin has been limited by poor absorption into the bloodstream through the digestive tract, requiring high doses to achieve desired blood levels.

BCM-95® is far more readily absorbed than other currently or previously available curcumin products and delivers up to seven times more pharmacologically bioactive curcumin to the bloodstream compared with commercial curcumin products.²²

Just one 400 mg dose of this bioavailability-enhanced turmeric extract is equivalent to taking 2,000 mg of standard "95%" curcumin extract.

Curcumin Inhibits NF-kB

Numerous studies show that curcumin and its related chemicals (collectively known as curcuminoids) help to prevent and fight a wide range of diseases—from cancer to cardiovascular disease—through a variety of mechanisms.^{1,5,7-19} These include powerful anti-inflammatory, antioxidant, chemopreventive (cancer-preventive), and antineoplastic (cancer-fighting) properties.

One of curcumin's most important activities in the human body is its ability to inhibit activation of the transcription factor, nuclear factor-kappa B (NF-kB),⁴⁻⁶ a potent inducer of chronic inflammation. NF-kB is a protein that acts as a sort of switch, turning on inflammation by activating genes involved in the production of inflammatory compounds. As NF-kB activation has been implicated in all the stages of carcinogenesis, this transcription factor is a potential target in cancer chemoprevention and the subject of intensive research.

Curcumin's Capabilities

Curcumin's benefits are so diverse that they affect virtually every organ system in the body. The National Institutes of Health has funded numerous studies investigating curcumin, which include diverse applications such as treatment of cystic fibrosis, the feasibility of controlling the autoimmune disease, scleroderma and various cancer chemoprevention trials.²³ Meanwhile, pharmaceutical companies around the world are actively working to derive patentable molecules based on curcumin which they hope to market as anticancer treatments.²⁴

Among other activities, curcumin has demonstrated antibacterial, antifungal, antiviral, anti-inflammatory and antioxidant capabilities.¹⁸ It's even showing promise in the fight against the most common

disorder in Caucasians, cystic fibrosis.¹⁴ To this list, add potent anticancer protection, cardiovascular protection and protection against neurodegenerative disorders, such as Alzheimer's and Parkinson's diseases.^{8,16,25-29} Additionally, curcumin shows promise as a potential treatment for multiple sclerosis,⁷ and may protect against cataracts³⁰ as well as reverse some of the damage associated with the high blood sugar levels that characterize diabetes.³¹ Curcumin also shows hope as a treatment for skin disorders such as psoriasis and in the treatment of wounds.^{9, 32}

Powerful Cancer Protection

One study claims that curcumin appears to possess all the desirable features of a desk-designed, multipurpose drug.³³ Other investigators focused on promising anticancer activity. "Curcumin emerged as one of the most powerful chemopreventive and anticancer agents," wrote Indian researchers last year. "Its biological effects range from antioxidant and anti-inflammatory to inhibition of angiogenesis, and is also shown to possess specific antitumoral activity."²⁷

Although anticancer drugs weaken the immune system, curcumin actually enhances it, ^{12,34-43} as an "immunorestorer."³⁴ Cancer prevention and treatment has emerged as one of the most avidly researched aspects of curcumin's potential benefits.

Scientists noted, "Pre-clinical studies in a variety of cancer cell lines including breast, cervical, gastric, hepatic, leukemia, oral epithelial, ovarian, pancreatic, and prostate have consistently shown that curcumin possesses anticancer activity in vitro and in pre-clinical animal models."⁴⁴ Other investigators wrote: "Carcinogenesis encompasses three closely associated stages: initiation, progression, and promotion. Curcumin has been shown to possess anti-inflammatory, antioxidant, and antitumor properties. It has also been shown to be beneficial in all three stages of carcinogenesis."

It's interesting to note that epidemiological studies show the incidence of prostate cancer among men in India to be among the lowest in the world. One recent study estimated that the annual prostate cancer incidence rate in India ranges from 5.0 to 9.1 per 100,000/year. In contrast, among white men in the United States, the incidence rate is 110.4 per 100,000/year—more than ten times higher compared with men from India. The rate for African Americans is even higher.⁴⁵ Perhaps not coincidentally, Indian men's consistent intake of turmeric, in the form of curry, is among the highest in the world. The average intake of turmeric in the Indian population is 2-2.5 g/day, providing 60-150 mg curcumin.

Pancreatic Cancer

Curcumin has also been shown to enhance the efficacy of the chemotherapy agent, gemcitabine treatment of pancreatic cancer. Although it is currently the best treatment for this aggressive cancer, gemcitabine often loses its effectiveness as cancer cells develop resistance to the drug. Scientists at the University of Texas M.D. Anderson Cancer Center showed recently that curcumin prevents

development of this resistance, in both cultured pancreatic cancer cells and in living animal models of the disease. “Overall, our results suggest that curcumin potentiates the antitumor effects of gemt in pancreatic cancer by suppressing proliferation, angiogenesis, NF-kB, and NF-kB-regulated g products,” concluded the scientists.⁴⁶

Colon and Breast Cancers

Curcumin’s efficacy against colon cancer has received great attention, primarily because curc bioavailability has been less of an issue, given that the colon is exposed to curcumin as it passes through the digestive tract.¹⁷ Its excellent tolerability and safety have been demonstrated in five I clinical trials in colon cancer, and Phase II trials are currently enrolling patients.⁴⁴ British investigators showed recently that curcumin interferes with the proliferation of various types of cancer, and that it enhances the efficacy of an existing chemotherapeutic agent, oxaliplatin.⁴⁷

Italian researchers reported recently that curcumin is effective against a common variety of breast cancer cells and a mutant line of cells that has developed resistance to common chemotherapy drugs. “Through analyses of the effects on cell proliferation, cycling and death, we have observed that antitumor activity of curcumin... is at least equal in the multi-drug-resistant breast cancer cell line compared to the ordinary breast cancer cell line,”⁴⁸ This efficacy also held true for a type of multi-drug-resistant leukemia cell.

This research indicates that curcumin seems capable of adapting its anticancer activity according to need. “Remarkably,” wrote the scientists, “curcumin and one of its derivatives appeared to modify their molecular effects according to the diverse gene expression patterns existing in the multidrug-resistant and ordinary breast cancer cell line. Clearly, the structure and properties of curcumin can form the basis for the development of antitumor compounds...”⁴⁸

Nervous System Protection

Curcumin may also provide protection from neurological damage, with at least 10 known neuroprotective actions. Dietary curcumin is a strong candidate for use in the prevention or treatment of major disabling age-related neurodegenerative diseases like Alzheimer’s, Parkinson’s, and stroke.”^{16 49}

Other researchers report that curcumin may chelate, or bind to toxic heavy metals, such as lead and cadmium, greatly reducing their toxicity to neurological tissues.⁵³

Scientists have reported that curcumin protects brain tissue against oxidative stress by promoting production of a protective enzyme, heme oxygenase-1 (HO-1). “In the central nervous system HO-1 has been reported to operate as a fundamental defensive mechanism for neurons exposed to an oxidant challenge.”⁵⁴ Traumatic injuries to the brain also result in oxidative stress, often affecting cognition and “synaptic plasticity,” which is believed to play a crucial role in healthy learning and memory. In animal experiments, researchers showed supplementation of curcumin in the diet dramatically reduced oxidative damage and counteracted the cognitive impairment caused by

traumatic brain injury.⁵⁵

Alzheimer's Disease Protection

Curcumin may offer protection against Alzheimer's disease, characterized by the accumulation of a malformed protein, amyloid-beta. Ordinarily, immune cells known as macrophages identify these defective proteins, engulf them and destroy them. But for reasons that are not entirely clear, macrophages fail to perform this crucial function in Alzheimer's disease.⁵⁷ Using animal models of Alzheimer's, scientists have shown that curcumin can enhance clearance of amyloid-beta, while reducing fibrils, which are also associated with Alzheimer's pathology. Curcumin's ability to cross the blood-brain barrier and directly bind to plaques may be important in its anti-amyloid activity.⁵⁸

Researchers tested the anti-amyloid activity of human macrophages taken from Alzheimer's disease patients. After incubation with curcumin in the laboratory, uptake of amyloid-beta by macrophages from half of the patients significantly increased. They concluded that this modification of the immune system by curcumin, might be a safe approach to immune clearance of abnormal amyloid-beta accumulation in Alzheimer's disease brain.⁵⁹ This data appears to indicate that curcumin is protective against the development of Alzheimer's disease, and that it may even help reverse the disease process, once begun.

Safety and Dosing

Given that turmeric is a food that has been safely consumed for millennia, curcumin would appear to be the perfect dietary supplement.³ In fact, "Curcumin has an outstanding safety profile and a number of multifunctional actions.¹⁶ Phase I clinical trials, using massive doses of curcumin (up to 8 g per day for four months) in human volunteers, did not result in discernible toxicities.¹⁷

Reported adverse reactions have been limited to mild gastrointestinal distress, which may be minimized by consuming curcumin with food.⁶⁰

Note: BCM-95® is a registered trademark of Dolcas-Biotech, LLC.

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