



# VKR TEX - Tutorials

**Manufacture of All Kinds of Auto loom Fabrics and Natural Dye Fabrics.**

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## Curcumin

**Curcumin** is the principal curcuminoid of the Indian curry spice turmeric, the other two curcuminoids being demethoxycurcumin and Bis-demethoxycurcumin. The curcuminoids are polyphenols and are responsible for the yellow color of turmeric. Curcumin can exist in at least two tautomeric forms, keto and enol. The enol form is more energetically stable in the solid phase and in solution. It is also hepatoprotective. Curcumin can be used for boron quantification in the so-called curcumin method. It reacts with boric acid forming a red colored compound, known as rosocyanine.

- Since curcumin is brightly colored, it may be used as a food coloring. As a food additive, its E number is E100.

### Potential medical uses

Curcumin is known for its antitumor, antioxidant, antiarthritic, anti-amyloid and anti-inflammatory properties. Anti-inflammatory properties may be due to inhibition of eicosanoid biosynthesis. In addition it may be effective in treating malaria, prevention of cervical cancer, and may interfere with the replication of the HIV virus. In HIV, it appears to act by interfering with P300/CREB-binding protein (CBP) of its reverse transcriptase.

Curcumin acts as a free radical scavenger and antioxidant, inhibiting lipid peroxidation and oxidative DNA damage. Curcuminoids induce glutathione S-transferase and are potent inhibitors of cytochrome P450.

For the last few decades, extensive work has been done to establish the biological activities and pharmacological actions of curcumin. Its anticancer effects stem from its ability to induce apoptosis in cancer cells without cytotoxic effects on healthy cells. Curcumin can interfere with the activity of the transcription factor NF- $\kappa$ B, which has been linked to a number of inflammatory diseases such as cancer. Indeed, when 0.2% curcumin is added to diet given to rats or mice previously given a carcinogen, it significantly reduces colon carcinogenesis (Data from sixteen scientific articles reported in the Chemoprevention Database). A 2007 report indicates that curcumin may suppress MDM2, an oncogene involved in mechanisms of malignant tumor formation.

A 2004 UCLA-Veterans Affairs study involving genetically altered mice suggests that curcumin might inhibit the accumulation of destructive beta-amyloid in the brains of Alzheimer's disease patients and also break up existing plaques associated with the disease. There is also circumstantial evidence that curcumin improves mental functions; a survey of 1010 Asian people who ate yellow curry and were between the ages of 60 and 93 showed that those who ate the sauce "once every six months" or more had higher MMSE results than those who did not. From a scientific

standpoint, though, this does not show whether the curry caused it, or people who had healthy habits also tended to eat the curry, or some completely different relationship.

Little curcumin, when eaten, is absorbed-- 2 grams of curcumin alone resulted in undetectable to very low serum levels. Much of it is excreted through glucuronidation. Co-supplementation with 20 mg of piperine (extracted from black pepper) significantly increased the absorption of curcumin by 2000%. However, due to its effects on drug metabolism, piperine should be taken cautiously (if at all) by individuals taking other medications. Some benefits of curcumin, such as the potential protection from colon cancer, may not require systemic absorption. Recently, a polymeric nanoparticle encapsulated formulation of curcumin ("nanocurcumin") has been synthesized which has the potential to bypass many of the shortcomings associated with free curcumin, such as poor solubility and poor systemic bioavailability. Nanocurcumin particles have a size of less than 100 nanometers on average, and demonstrate comparable to superior efficacy compared to free curcumin in human cancer cell line models.

## Risks

Kawanishi et al. (2005) remark that curcumin is a "double-edged sword" having both anti-cancer and carcinogenic effects.<sup>1</sup> Carcinogenic effects are inferred from interference with the p53 tumor suppressor pathway, an important factor in human colon cancer. Carcinogenic and LD50 tests in mice and rats, however, have failed to establish a relationship between tumorigenesis and administration of curcumin in turmeric oleoresin at >98% concentrations. This may prove curcumin medicinally useful as it helps activate p53<sup>[citation needed]</sup>. When a cell is inhibited by cancer the concentrations of p53 increase, helping cells defend against cancer mechanisms. But it may also suppress p53 levels, preventing cells from initiating defensive mechanisms, a response seen only in certain diseases .

IUPAC name	(1 <i>E</i> ,6 <i>E</i> )-1,7-bis(4-hydroxy-3-methoxyphenyl)-1,6-heptadiene-3,5-dione
Other names	curcumin diferuloylmethane C.I. 75300 Natural Yellow 3
<b>Identifiers</b>	
CAS number	458-37-7
SMILES	<chem>Oc1ccc(cc1OC)/C=C/C(=O)CC(=O)/C=C/c2ccc(O)c(OC)c2</chem>
<b>Properties</b>	
Molecular formula	C <sub>21</sub> H <sub>20</sub> O <sub>6</sub>
Molar mass	368.38 g/mol
Appearance	Bright Yellow

	to Orange powder
Melting point	183°C (361 K)
<b>Hazards</b>	
Except where noted otherwise, data are given for materials in their standard state (at 25 °C, 100 kPa) Infobox disclaimer and references	