




REVIEW



## Therapeutic Effects of Curcumol in Several Diseases; An Overview

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### ABSTRACT

*Curcuma Rhizoma*, also known as *Ezhu* is a traditional Chinese medicine that has been used for many centuries against several diseases. The rhizome of the plant is composed of curcuminoids (curcumin, demethoxycurcumin, and bisdemethoxycurcumin), and essential volatile oils including curcumol, curdione, and germacrone. While curcuminoids have been extensively studied for their antimicrobial, antioxidant, anti-inflammatory and anticancer properties, the therapeutic efficacy of curcumol is still emerging. Recent studies have shown anticancer properties of curcumol against multiple solid tumors such as breast, colorectal, head and neck, and lung adenocarcinomas. The underlying anti-tumor mechanisms revealed inhibition of several signaling pathways (NF- $\kappa$ B, MAPK, PI-3K/AKT, and GSK-3 $\beta$ ) associated with cell proliferation, survival, anti-apoptosis, invasion and metastasis. Besides curcumol, extracts from the *Curcuma Rhizoma* roots possess many other terpenoids such as  $\beta$ -elemene,  $\delta$ -elemene, germacrone, furanodiene and furanodienone with known anticancer properties. In this review, we comprehensively focused on the composition of *Curcuma Rhizoma* essential oils, their structure, isolation and therapeutic uses of curcumol to aid in the improvement and development of novel drugs with minimal cytotoxicity, enhanced efficacy, and less cost.

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## Introduction

The global acceptance of traditional medicines has prevailed for centuries, and there has been an increasing interest in phytochemicals derived from medicinal plants as a potential source for therapeutic applications against multiple chronic diseases including cancer, diabetes, cardiovascular and neurodegenerative disorders (1–4). Also, phytochemicals produced from these plants are helpful to the environment and agriculture due to their extensive biological and chemical properties (5). Importantly, medicinal plants, unlike pharmacological drugs are found to have less harmful effects and are easily accessible and affordable (6).

*Zingiberaceae* which is commonly known as a ginger family is spread throughout the tropical areas of Asia, Africa, and America. They consist of 1300 species of flowering plants that are divided into perennial herbs with tuberous rhizomes (7). *Curcuma longa* (*C. longa*) is a perennial herb and a member of the *Zingiberaceae* family, used in the production of many

complex compounds essential in food preparation such as spices, seasoning and flavoring agents. They are also used in cosmetic and pharmaceutical industries as therapeutic pharmacological agents (8). Essential oils and phenolic pigments are the main components of *Curcuma* plants (9). Besides, the roots of *C. longa* contain a variety of pigments that provide color and flavor to the food (10,11) and are also an essential ingredient of curry powder in Asian cuisines (12). For thousands of years, *Curcuma Rhizoma* (*Zingiberaceae* family) has been traditionally used to treat blood stasis (13) and in alleviating pain (14). However, recent studies have shown it to possess many nontoxic polyphenolic derivatives such as curcumin, demethoxycurcumin, and bisdemethoxycurcumin that have a strong therapeutic potential against many cancers (15), while *Curcuma Radix* and the dry root tubers of *Curcuma wenyujin*, *Curcuma phaeocalis*, and *Curcuma kwangsiensis*, which are collectively known as zedoary in the Chinese Pharmacopeia (16,17) are used in the treatment of rheumatic