

# hormetic effects of curcumin: What is the evidence?

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Curcumin (diferuloylmethane), a component of the yellow powder prepared from the roots of *Curcuma longa* or Zingiberaceae (known as turmeric) is not only widely used to color and flavor food but also used as a pharmaceutical agent. Curcumin demonstrates anti-inflammatory, anticarcinogenic, antiaging, and antioxidant activity, as well as efficacy in wound healing. Notably, curcumin is a hormetic agent (hormetin), as it is stimulatory at low doses and inhibitory at high doses. Hormesis by curcumin could be also a particular function at low doses (i.e., antioxidant behavior) and another function at high dose (i.e., induction of autophagy and cell death). Recent findings suggest that curcumin exhibits biphasic dose?responses on cells, with low doses having stronger effects than high doses; examples being activation of the mitogen-activated protein kinase signaling pathway or antioxidant activity. This indicates that many effects induced by curcumin are dependent on dose and some effects might be greater at lower doses, indicative of a hormetic response. Despite the consistent occurrence of hormetic responses of curcumin in a wide range of biomedical models, epidemiological and clinical trials are needed to assess the nature of curcumin?s dose?response in humans. Fortunately, more than one hundred clinical trials with curcumin and curcumin derivatives are ongoing. In this review, we provide the first comprehensive analysis supportive of the hormetic behavior of curcumin and curcumin derivatives. © 2018 Wiley Periodicals, Inc.

biphasic effect

curcumin

hormesis

hormetic response

curcumin

heat shock protein

nonsteroid antiinflammatory agent

curcumin

aging

Alzheimer disease

Curcuma longa

drug effect

gastrointestinal toxicity

heart protection

hormesis

human

liver toxicity

malignant neoplasm

metabolic syndrome X

morphine tolerance

nephrotoxicity

neuroprotection

nonhuman

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Review

stress

systematic review

wound healing

animal

hormesis

physiology

Animals

Curcumin

Hormesis

Humans