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Abstract

Curr Pharmacol Rep. 2015 Apr;1(2):129-139. Epub 2015 Jan 30.

"Curcumin, the King of Spices": Epigenetic Regulatory Mechanisms in the Prevention of Cancer, Neurological, and Inflammatory Diseases.

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Abstract

Curcumin (diferuloylmethane), a polyphenolic compound, is a component of *Curcuma longa*, commonly known as turmeric. It is a well-known anti-inflammatory, anti-oxidative, and anti-lipidemic agent and has recently been shown to modulate several diseases via epigenetic regulation. Many recent studies have demonstrated the role of epigenetic inactivation of pivotal genes that regulate human pathologies, such as neurocognitive disorders, inflammation, obesity, and cancers. Epigenetic changes involve changes in DNA methylation, histone modifications, or altered microRNA expression patterns which are known to be interconnected and play a key role in tumor progression and failure of conventional chemotherapy. The majority of epigenetic changes are influenced by lifestyle and diets. In this regard, dietary phytochemicals as dietary supplements have emerged as a promising source that are able to reverse these epigenetic alterations, to actively regulate gene expression and molecular targets that are known to promote tumorigenesis, and also to prevent age-related diseases through epigenetic modifications. There have been several studies which reported the role of curcumin as an epigenetic regulator in neurological disorders, inflammation, and in diabetes apart from cancers. The epigenetic regulatory roles of curcumin include (1) inhibition of DNA methyltransferases (DNMTs), which has been well defined from the recent studies on its function as a DNA hypomethylating agent; (2) regulation of histone modifications via regulation of histone acetyltransferases (HATs) and histone deacetylases (HDACs); and (3) regulation of micro RNAs (miRNA). This review summarizes the current knowledge on the effect of curcumin in the treatment and/or prevention of inflammation, neurodegenerative diseases, and cancers by regulating histone deacetylases, histone acetyltransferases, and DNA methyltransferases.

KEYWORDS: Cancer; Curcumin; DNA methylation; Epigenetics; Histone modification; Nrf2

PMID: 26457241 [PubMed] PMCID: PMC4596544 [Available on 2016-04-01]

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