

Editorial



Curcumin: A Promising Spice for Therapeutics

Over the last half century extensive research has made it clear that most chronic diseases can only be cured using multi-targeted therapy as opposed to mono-targeted. Consequently, agents that can modulate multiple cellular targets are now attractive objects of research. Moreover, phytochemicals have potent pharmacological properties and have provided multiple active compounds in the past as well as today. The chemical diversity, structural complexity, availability, lack of significant toxic effects and intrinsic biologic activity of natural products make them ideal candidates for new therapeutics. As this issue shows, curcumin, a polyphenol derived from dried rhizomes of the perennial herb *Curcuma longa* Linn (commonly known as turmeric), is one such agents.

Curcumin was first isolated approximately two centuries ago and its structure as diferuloylmethane was elucidated in 1910. It is a gold-coloured spice extensively used in the Indian subcontinent, not only for health care but also for food conservation and as a yellow dye for textiles. Curcumin has traditionally been used for centuries in its originating countries to treat numerous illnesses, including rheumatism, body ache, skin diseases, digestive and inflammatory disorders, intermittent fevers, urinary discharges, leukoderma and amenorrhoea.

Over the last few years, a number of studies have reported evidence of several pharmacological properties of curcumin, including chemosensitization, radiosensitization, wound healing activities as well as antimicrobial, antiviral, antifungal, cholekinetic and anti-inflammatory effects. The polyphenolic compound binds to a diversity of proteins and inhibits the activity of various kinases. In fact, curcumin can down-regulate different pro-inflammatory cyto-

kine and chemokine expressions, most likely by inactivating various nuclear transcription factors.

Similarly, research data have provided evidence of the immunomodulatory potential of curcumin. It can modulate the activation of T and B cells, macrophages, neutrophils, natural killer and dendritic cells. Nevertheless, curcumin at low doses can also enhance antibody responses. Moreover, curcumin lowers serum cholesterol and lipid peroxide levels in healthy individuals, suggesting a possible role in arterial diseases.

In the last two decades, curcumin has been reported as a potent antioxidant due to its ability to scavenge the mutagenic/carcinogenic reactive oxygen species. Besides its antioxidant activity, curcumin's ability to bind β -amyloids can potentially enhance neuronal survival, decreasing the risk of central nervous system neurodegenerative disorders and affording a better quality of life during human aging.

Due to its ability to affect the multistep process of carcinogenesis, its remarkable antiangiogenic properties and its ability to induce apoptosis in different target tumoral cells, curcumin is being considered as a promising new anti-cancer agent. As a result, there is extensive interest in the clinical development of this compound as evidenced by the development of phase I clinical trials and current enrolment in phase II clinical trials.

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However, the potential use of curcumin in chemopreventive or therapeutic settings has been hindered by its short biological half-life and low bioavailability after oral administration. In consequence, several groups have investigated different ways to enhance it, for example using piperine, liposomal curcumin, nanoparticles of curcumin or synthetic analogues of curcumin. As regards to toxicity, several studies have demonstrated minimal toxicity with moderate doses of the polyphenol administered in various formulations. Accordingly, more extensive and well-controlled clinical trials are now needed to fully evaluate

its potential in terms of optimal dose, route of administration and possible interactions with other drugs.

Clearly, taking into account the low cost of curcumin, its established chemopreventive and therapeutic potential, and not least its pharmacological safety for most diseases, there is no doubt that curcumin is a promising "spice" for therapeutics.

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