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ABSTRACT

Curcumin Nitric Oxide Enhances Its Anti-Cancer and Anti-Inflammatory Effects

Raghad Bahar ¹
Al-Quds University ¹

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Cancer is a leading cause of death worldwide, and most drugs currently available for the treatment of cancer have limited potential. Natural products or their structural relatives have been the mainstay of cancer chemotherapy for the past few decades and still comprise about 50% of the drugs that are used for cancer chemotherapy. Curcumin is one of the natural drugs that recently attracted close attention due to its putative cancer-preventing and even anticancer properties on its own. In addition, since its discovery as a crucial signaling molecule, great hopes are emerging for new Nitric Oxide-based treatments of a wide variety of diseases. Here, we tested the anti-cancer effects of Nitro-Curcumin. We hypothesized that by joining the effects of curcumin and NO in one compound, the treatment and prevention of cancer will be more potent than curcumin alone since this compound retains the pharmacological activity of the parent compound curcumin and also has the biological actions of NO, a strategy that has not been implemented before in cancer treatment and prevention. To compare the anti-cancer effects of curcumin and NO-curcumin, we treated different cancer cell lines using both compounds and tested their effects on different cancer cell lines' proliferation and death. Because colitis is a colon cancer predisposing factor, we evaluated the anti-inflammatory effect of NO-curcumin in mice in vivo using dextran sulfate-induced colitis model. Our results showed that NO-curcumin is more effective in reducing cell proliferation and increasing cell death when compared to curcumin alone. In addition NO-curcumin has a lower half maximal inhibitory concentration (IC₅₀) compared to curcumin. Altogether, our results demonstrate, for the first time, that NO-curcumin has more potent anti-cancer and anti-inflammatory effects, which makes it a potential future treatment for cancer and inflammation.