Curcumin induces apoptosis in a murine mammary gland adenocarcinoma cell line through the mitochondrial pathway

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Abstract

Curcumin, a phenol in turmeric (Curcuma longa), has been studied for the last decade as a potential anticancer drug. It has been shown to reduce viability of the highly malignant, metastatic rat mammary gland cell line ENU1564 in culture and reduce metastasis of these cells injected into nude mice. The purpose of this study was to identify the mechanisms by which curcumin induces apoptosis in these ENU1564 cells in vitro, and to examine its effects on mitochondrial membrane potential and mitochondrial Ca2+ homeostasis. The results show that curcumin induced apoptosis in ENU1564 cells through the intrinsic pathway of apoptosis, as evident by an increase in mitochondrial Ca2+ accumulation and a decrease in mitochondrial membrane potential. However, treatment of the ENU1564 cells with the mitochondrial uniporter inhibitor RU-360 prior to curcumin treatment partially inhibited the curcumin effects. SKF-96365, a store-operated Ca2+ channel blocker, suppressed the curcumin effect on mitochondrial Ca2+. In addition, curcumin down-regulated the expressions of Bcl-2 and procaspase-3 and increased the production of reactive oxygen species in ENU1564 cells. These data suggest that the mitochondrial Ca2+ is the leading factor by which curcumin induced apoptosis in ENU1564 cells, followed by reactive oxygen species production and inhibition of Bcl-2 oncoprotein.
Effect of Curcumin and Meriva on the Lung Metastasis of Murine Mammary Gland Adenocarcinoma

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Abstract.

Background: Curcumin is one of the most studied natural compounds which has been used as a feed additive for centuries. Curcumin exhibits low oral bioavailability in rodents and human. Curcumin formulated with phosphatidylcholine (Meriva) increases curcumin bioavailability five-fold compared to original curcumin. The aim of this study was to evaluate the efficacy of curcumin conjugated with phosphatidylcholine as an anticancer agent. Materials and Methods: In this xenograft study, mammary gland tumor cell line (ENU1564) was inoculated into the mammary fat pad of athymic nude mice. The mice were treated orally with either curcumin or Meriva. The tumor and its lung metastasis were evaluated grossly, microscopically, and immunohistochemically. Results: Meriva significantly decreased the expression of MMP-9 and lung metastasis of our cell line used in this experimental model. Conclusion: Curcumin conjugated with phosphatidylcholine increased the efficacy of curcumin as an anticancer agent.