Induction of Apoptosis by Curcumin in Cancer Cells

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Multiple myeloma (MM), a plasma cell malignancy, remains incurable despite the development of new therapies. MM is the second most frequent hematological malignancy in the United States. Curcumin (diferuloylmethane), the active ingredient in turmeric (Curcuma longa), is a potent chemo-preventive agent that prevents cancer progression via its anti-proliferative action. This study investigates whether curcumin can enhance apoptosis to suppress proliferation of the myeloma cell line OPM2. A cell viability assay (MTS) showed a dose–dependent decrease in cell proliferation with less than 20% viability noted at an 80μM concentration of curcumin. After morphological changes indicative of apoptosis were observed in microscopy, flow cytometry analysis was conducted with the markers Annexin V and Propidium Iodide (PI) to quantitatively identify apoptotic cells. Results demonstrated a drastic increase in OPM2 cells undergoing apoptosis 24 hours post-incubation with doses of curcumin ranging from 10 to 80μM. Western blot analyses showed cleavage of caspase-3 while cyclin D1 was suppressed, 24 hours post-treatment, showing that caspase-dependent cell cycle arrest occurs between the G1 and S phase. The results of this study indicate that curcumin exhibits strong anticancer properties. Its ability to induce cell death by enhancing the apoptotic pathway suggests that curcumin has potential and needs further evaluation as a chemotherapeutic agent in combination therapy.