Enhanced anti-proliferative and pro-apoptotic activities of a novel Curcumin-related compound in Jurkat T-cells

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Background: Curcumin is a naturally occurring polyphenol produced in the rhizome of Curcuma longa. The positive health effects of Curcumin (anti-inflammatory, anti-carcinogenic and antioxidative properties) have widely been studied. Inhibition of arachidonic acid metabolism by curcumin has been suggested to be a key mechanism for its anti-carcinogenic action. Recently, we reported about the synthesis of 7 novel curcumin analogues and their evaluation as selective COX-1 inhibitors. Compound 3 (HP102) was selected to evaluate its possible anti-carcinogenic features in Jurkat T-cells.

Materials and Methods: Jurkat T-cells were stimulated with PMA/PHA in the absence or presence of different concentrations of HP102. IL-2 promoter activity and IL-2 release was analyzed by a luciferase reporter assay and ELISA, respectively. The effect of HP102 on cell viability, proliferation and apoptosis were monitored by XTT-assay, Annexin-V/7-AAD staining and Western blot.

Results: Data showed that HP102 effectively blocked IL-2 expression in Jurkat cells in a dose-dependent manner. Compared to Curcumin, HP102 was about 10 times more effective in inhibition of IL-2 synthesis. Enhanced effects of HP102 towards Curcumin were also observed by monitoring cell viability, proliferation and apoptosis.

Conclusion: The Curcumin analogue HP102 strongly improved the anti-proliferative and pro-apoptotic potential of the natural occurring Curcumin in Jurkat T-cells and might be a useful tool for the supportive care in T-cell leukemia in the future.

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