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Induction of apoptosis by L-sulforaphane in human U937 monocyte leukemia cells through the caspase-3 activation

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L-sulforaphane is a naturally occurring substance of chemopreventive activity and found in cruciferous vegetables such as broccoli, sprouts and kale. This compound is a potent inducer of protective enzymes that provide defense against cancer-causing chemicals. In the present study, it was examined the effects of L-sulforaphane on the growth of U937 cell in order to investigate the anti-proliferative mechanism of L-sulforaphane. Treatment of U937 cells to L-sulforaphane resulted in the growth inhibition, morphological change and induction of apoptotic cell death in a dose-dependent (1 μ M~4 μ M) manner as measured by hemocytometer counts and MTT assay. Induction of apoptotic cell death in U937 cells, was associated with a marked up-regulation of pro-apoptotic protein Bax and cyclin-dependent kinase (Cdk) inhibitor p21(WAF1/CIP1) by p53-independent manner. Additionally, L-sulforaphane treatment induced the activation of caspase-3, which is believed to play a central role in the apoptotic signaling pathway. Taken together, these findings suggest that L-sulforaphane may be a potential chemotherapeutic agent for the control of U937 cells and further studies will be needed to identify the active compounds that confer the anti-cancer activity of L-sulforaphane. Once such compounds are identified, the mechanisms by which they exert their effects can begin to be characterized.