Hydrazinocurcumin, a synthetic curcumin derivative, inhibits tumor angiogenesis

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Background Angiogenesis is a crucial process for the outgrowth of cancer cells and their spreading into other tissues. Effective inhibition of the process is considered as a promising way to cure angiogenesis-related diseases including cancer. Curcumin, a natural compound from turmeric (Curcuma aromatica), has been known as a chemopreventive agent and now under clinical trial. We and other group have shown that curcumin has strong anti-angiogenic activity both in vivo and in vitro.

Methods To develop more active derivatives of curcumin, we synthesized several curcumin derivatives i.e. hydrazinocurcumin, hydrazinobenzoylcurcumin, oximecurcumin and benzyloximecurcumin, and examined their anti-angiogenic activities by using in vitro angiogenesis assays.

Results Among the synthetic curcumin derivatives tested, hydrazinocurcumin showed potent anti-angiogenic activities both in vivo and in vitro. Hydrazinocurcumin inhibited bFGF-induced proliferation, tube formation, chemoinvasion, and chemomigration of BAECs and showed 10-fold stronger activity than that of curcumin. Furthermore, it inhibited neovascularization of egg chorioallantonic membrane in vivo. Interestingly, hydrazinocurcumin showed a little or no toxicity toward other cultured epithelial cells including normal CHANG liver cells, A498-kidney epithelial cells, and HT29-colon carcinoma cells at the same concentration that used in vitro angiogenesis assay to BAEC cells.

Discussion These data strongly demonstrate that hydrazinocurcumin has potent anti-angiogenic activities with little toxicity and can be developed as a novel anti-angiogenic agent.