

Inhibition of angiogenesis by humulone, a bitter acid from beer hop.

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Abstract

On the basis of our previous finding that humulone, a bitter acid from beer hop extract, was a potent inhibitor of bone resorption and inhibited the catalytic activity of cyclooxygenase-2 (COX-2) and more potently the transcription of the COX-2 gene, we examined the effect of humulone on angiogenesis, using chick embryo chorioallantoic membranes (CAMs) and vascular endothelial and tumor cells. Humulone significantly prevented in vivo angiogenesis in CAM in a dose-dependent manner with an ED(50) of 1.5 microg/CAM. Humulone also inhibited in vitro tube formation of vascular endothelial cells. Moreover, it suppressed the proliferation of endothelial cells and the production of vascular endothelial growth factor (VEGF), an angiogenic growth factor, in endothelial and tumor cells. Thus, humulone is a potent angiogenic inhibitor, and may be a novel powerful tool for the therapy of various angiogenic diseases involving solid tumor growth and metastasis.

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