(-)-Epigallocatechin Gallate, a Major Component of Green Tea, Inhibits Erk-1/2 Activation and Vegf Expression by Serum Deprivation in Human Colon Carcinoma Cells

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Background Epidemiological studies have shown that the consumption of green tea lowers the risk of developing gastric and colon cancers. Catechins are key components of teas that have antiproliferative properties.

Methods We investigated the effects of green tea catechins on intracellular signalling and VEGF induction in vitro in serum-deprived HT29 human colon cancer cells and in vivo on the growth of HT29 cells in nude mice.

Results In the in vitro studies, (-)-epigallocatechin gallate (EGCG), the most abundant catechin in green tea extract, inhibited Erk-1 and Erk-2 activation in a dose-dependent manner. However, other tea catechins such as (-)-epigallocatechin (EGC), (-)-epicatechin gallate (ECG), and (-)-epicatechin (EC) did not affect Erk-1 or 2 activation at a concentration of 30 µM. EGCG also inhibited the increase of VEGF expression and promoter activity induced by serum starvation. In the in vivo studies, athymic BALB/c nude mice were inoculated subcutaneously with HT29 cells and treated with daily intraperitoneal injections of EC (negative control) or EGCG at 1.5 mg/day/mouse starting 2 days after tumour cell inoculation. Treatment with EGCG inhibited tumour growth (58%), microvessel density (30%), and tumour cell proliferation (27%) and increased tumour cell apoptosis (1.9-fold) and endothelial cell apoptosis (3-fold) relative to the control condition (P<0.05 for all comparisons).

Conclusions EGCG may exert at least part of its anticancer effect by inhibiting angiogenesis through blocking the induction of VEGF.