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REPORT**Green tea: prevention and treatment of cancer by nutraceuticals**

Editor's note: The following independently written article was originally published in the September 18, 2004, issue of the British medical journal The Lancet [Elsevier Lancet 2004 Sep 18;364(9439):1021-2.] British spelling was retained in this article, which is reprinted with permission. For more information on recent research indicating the numerous health benefits of green tea, please refer to the article on page 38.

Green tea¹ has always been considered by the Chinese and Japanese peoples as a potent medicine for the maintenance of health, endowed with the power to prolong life. Recently, Yean Lee and colleagues² looked at the effects of the main active green tea constituent, epigallocatechin-3 gallate (EGCG) on chronic lymphocytic leukaemia B cells isolated from leukaemic patients. These cells are characterised by their resistance to apoptosis because they secrete and bind vascular endothelial growth factor (VEGF), a potent angiogenic cytokine that also acts as a crucial survival factor for tumour cells. The researchers showed that addition of EGCG to these cells markedly decreased VEGF-receptor phosphorylation, leading to the disruption of the VEGF-dependent autocrine pathway that protects the cells from apoptosis and cell death.

These results support our observations³ on the potent inhibition of the activity of VEGF-receptor tyrosine kinase by components of green tea, and provide strong evidence that this inhibitory effect may have profound repercussions on tumours that depend on this cytokine for progression. Of considerable importance is the low concentration of EGCG required to trigger the observed biological effects, because VEGF-receptor activity can be inhibited³ and apoptosis of leukaemia B cells can be induced² with concentrations of EGCG in the plasma after moderate drinking of green tea (2-4 cups a day).⁴ Although more extensive investigation on the effects of this compound in patients with chronic lymphocytic leukaemia B is required, these findings nevertheless raise the interesting possibility that green tea could be used as a combination agent for treating leukaemia.

VEGF is also crucially important to tumour angiogenesis, the process by which tumours grow and invade surrounding host tissues.⁵ In the initial phases of tumour growth, angiogenesis by low-dose delivery of EGCG, as seen *in vitro*,^{3,7} could thus have beneficial *in-vivo* effects against several other types of cancer. This mechanism also provides a strong scientific basis for the chemopreventive property of green tea that has been inferred from several epidemiological studies which showed that frequent drinking of green tea is inversely associated with the risk of developing several types of human cancer, such as oesophageal cancer.⁸

With the notable exception of the use of retinoic acid for the treatment of promyelocytic leukaemia,⁹ the importance of nutraceuticals in cancer prevention and treatment remains largely under-exploited despite increasing evidence showing that these molecules have chemopreventive and chemotherapeutic ability. Notwithstanding the considerable progress made in the design of novel anticancer drugs in recent years, one clear lesson from the past decades of research into cancer is that, although we can treat cancer and induce remission, survival rates have changed little in most cancers. Moreover, most anticancer drugs have several toxic side effects that may produce a poor quality of life for patients and considerable cost in supportive care. Green tea and other diet-derived compounds, such as curcumin, phyto-estrogens and carotenoids,¹⁰ offer several advantages as anticancer products, because these compounds are non-toxic, produce few side effects, are widely available, and are cheap. It would thus be interesting to examine the beneficial effects of including green tea in the diet of patients undergoing treatment for cancer as well as in patients at high risk of recurrence, such as those in remission after treatment and those at risk for a second neoplasm.

We believe that anticancer agents designed by nature and used for several thousands of years with little toxicity may prove useful in treating and preventing cancer. Results such as those obtained by Lee and co-workers² show that food derived chemicals constitute a complementary source of anticancer agents.

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References

1. Demeule M, Michaud-Levesque J, Annabi B, et al. Green tea catechins as novel anti-tumor and antiangiogenic compounds. *Curr Med Chem Anti- Canc Agents*. 2002;2:441-63.
2. Lee YK, Bone ND, Strege AK, Jelinek DF, Kay NE. VEGF receptor phosphorylation status and apoptosis is modulated by a green tea component, epigallocatechin-3-gallate (EGCG) in B cell chronic lymphocytic leukemia. *Blood*. 2004;104:788-94.
3. Lamy S, Gingras D, Beliveau R. Green tea catechins inhibit vascular endothelial growth factor receptor phosphorylation. *Cancer Res*. 2002;62:381-5.
4. Pisters KM, Newman RA, Coldman B, et al. Phase I trial of oral green tea extract in adult patients with solid tumors. *J Clin Oncol*. 2001 Mar 15;19(6):1830-8.
5. Folkman J. Fundamental concepts of the angiogenic process. *Curr Mol Med*. 2003;3:643-51.
6. Bergers G, Song S, Meyer-Morse N, Bergsland E, Hanahan D. Benefits of targeting both pericytes and endothelial cells in the tumor vasculature with kinase inhibitors. *J Clin Invest*. 2003;111:1287-95.
7. Cao Y, Cao R. Angiogenesis inhibited by drinking tea. *Nature*. 1999;398:381.
8. Gao TY, McLaughlin JK, Blot WJ, Ji BT, Dai Q, Fraumeni JF, Jr. Reduced risk of esophageal cancer associated with green tea consumption. *J Natl Cancer Inst*. 1994;86:855-8.
9. de Botton S, Coiteux V, Chevret S. Outcome of childhood acute promyelocytic leukemia with all-trans-retinoic acid and chemotherapy. *J Clin Oncol*. 2004;22:1404-12.
10. Gescher AJ, Sharma Ra, Steward WP. Cancer chemoprevention by dietary constituents: a tale of failure and promise. *Lancet Oncol*. 2001;2:371-9.

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