



In Vivo Antitumor Effect of Ascorbic Acid, Lysine, Proline, and Green Tea Extract on Human Colon Cancer Cell HCT 116 Xenografts in Nude Mice: Evaluation of Tumor Growth and Immunohistochemistry

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In this study, we tested the efficacy of a specific micronutrient combination against colon cancer induced in mice models. The experiments evaluated the effects of a specific micronutrient combination on key cellular mechanisms involved in the growth and spread of colon cancer. Among these, we tested the effects of micronutrients on the secretion of collagen digesting enzymes - matrix metalloproteinases (MMPs), the level of which indicates the aggressiveness of the cancer. We also tested the secretion level of vascular endothelial growth factor (VEGF) and other proteins, which are an important part of cellular signaling pathways promoting blood vessel growth in tumors (angiogenesis).

Our results demonstrated that the micronutrient synergy combination significantly suppressed the growth of colon cancer in mice. The tumors developed in the micronutrient supplemented group were 63% smaller than in the control group. Microscopic examination confirmed that these tumors had a poor blood vessel network and consequently, they received less nourishment for growth. In addition, a specific type of staining indicated reduced secretion of MMPs and VEGF, both of which are indicators of a decreased potential of metastasis.

Our previous studies using colon cancer cells in vitro have shown that the nutrient mixture was effective in inhibiting the colon cancer cells invasion in the collagen matrix by 100%.