Effect of arginine on angiogenesis induced by human colon cancer: in vitro and in vivo studies

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Abstract

This study investigated the effect of arginine (Arg) supplementation on angiogenesis in human colon cancer. The in vitro study investigated the effects of different Arg levels and inducible nitric oxide (iNO) synthase inhibitor on angiogenic protein expressions stimulated by SW480 cells. The results showed that the production of vascular endothelial growth factor (VEGF), basic fibroblast growth factor with 100 and 1000 μmol/L Arg and matrix metalloproteinase (MMP)-2 with 1000 μmol/L Arg was lower than that with 0 and 50 μmol/L Arg. Inhibition of iNO resulted in higher angiogenic protein expressions comparable with groups with low Arg administration, indicating that Arg administration at levels similar to or higher than physiological concentrations reduced the progression of colon cancer, and iNO may partly play a role in reducing angiogenesis. The in vivo study used a human colon cancer xenograft model in nude mice. Mice were inoculated with 1×107 SW480 cells and assigned to two groups. The control group was fed a semipurified diet, while the experimental group was supplied an Arg-supplemented diet. After 5 weeks, tumors were harvested and spleens were excised for further analysis. Results showed that the MMP-2, MMP-9 and VEGF receptor levels in tumors were significantly lower, whereas tumor NO levels and spleen natural killer (NK) cell activities were higher in the Arg group than in the control group. These results were consistent with the in vitro study that dietary Arg supplementation inhibits the progression of colon cancer possibly by increasing NO secretion and consequently enhancing NK cell activity.