



# *In Vitro* and *In Vivo* Antitumor Effect of a Nutrient Mixture Containing Ascorbic Acid, Lysine, Proline, and Green Tea Extract on Human Synovial Sarcoma Cancer Cells

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## Abstract

### **Introduction:**

Synovial sarcoma, a soft tissue cancer that most often occurs around leg or arm joints, has a 50% rate of metastasis. Structural changes in the extracellular matrix (ECM) are necessary for cancer cell migration and invasion.

### **Objective:**

This prompted us to investigate the effect of a nutrient mixture containing lysine, proline, ascorbic acid, and green tea extract (NM) on the growth of human synovial sarcoma cell Hs 701.T xenografts in athymic nude mice, and on the invasive potential of human synovial sarcoma cells SW 982, *in vitro*.

### **Methods:**

Male nude mice, 5-6 weeks of age, were inoculated with  $3 \times 10^6$  synovial sarcoma Hs 701.T cells, divided into two groups, and fed either a regular diet or a diet supplemented with 0.5% NM. After four weeks, tumors were excised, weighed, and processed for histology. In addition, the *in vitro* effect of NM on human synovial sarcoma cells SW 982 was evaluated: cell proliferation by MTT assay, MMP secretion by gelatinase zymography, and invasion through Matrigel.

### **Results:**

NM reduced the size of synovial sarcoma tumors in nude mice by 44%. *In vitro*, NM inhibited the secretion of both MMPs in a dose-dependent fashion with virtual total inhibition of MMP-2 at 500  $\mu$ g/ml and MMP-9 at 50  $\mu$ g/ml concentration and blocked the invasion of human synovial sarcoma cells through Matrigel at 1000  $\mu$ g/ml NM ( $p < 0.0001$ ).

### **Conclusion:**

Our results suggest NM is potentially an excellent candidate for therapeutic use in the treatment of synovial sarcoma, by inhibiting tumor growth and critical steps in cancer development, such as inhibiting MMP secretion and invasion.