



Antitumor Effect of Nutrient Synergy on Human Bladder Cancer Cell Lines T-24

M.W. Roomi, V. Ivanov, A. Niedzwiecki, M. Rath
Matthias Rath Research., Cancer Research Division, Santa Clara, CA 95050

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Abstract

Background:

Bladder cancer, the fourth most frequently diagnosed cancer in men and the tenth in women, develops mainly in older adults. If treated while in situ, prognosis is excellent. Once the cells have metastasized, prognosis is poor. We investigated the synergistic effect of a unique nutrient formulation (NM) containing lysine, proline, arginine, ascorbic acid, and epigallocatechin gallate on human bladder cancer cells T-24 by measuring: viability, modulation of MMP-2 and -9 expression, and cancer cell invasive potential.

Materials and Methods:

Human bladder cancer cells T-24 (ATCC) were grown in McCoy medium supplemented with 10% FBS, penicillin (100 U/ml) and streptomycin (100 mg/ml) in 24-well tissue culture plates. At near confluence, the cells were treated with NM dissolved in media and tested at 0, 10, 100, 500, and 1000 µg/ml in triplicate at each dose. Cells were also treated with PMA 200 ng/ml to study enhanced expression of MMP-9. Cell proliferation was evaluated by MTT assay, MMP expression by gelatinase zymography, and invasion through Matrigel.

Results:

The nutrient mixture (NM) with and without PMA 200 ng/ml showed no significant antiproliferative effect on human bladder cancer cell growth. Zymography demonstrated no MMP expression by untreated bladder T-24 cells and slight secretion of MMP-2 and MMP-9 by PMA (200 ng/ml) treated cells. NM inhibited the T-24 cell expression of MMP-2 and -9 in a dose-dependent fashion, with virtual total inhibition of MMP-2 at 500 µg/ml and MMP-9 at 100 µg/ml NM. The synergistically acting nutrient mixture significantly reduced the invasion of human bladder cancer cells T-24 through Matrigel in a dose-dependent fashion, with 95% inhibition at 100 µg/ml and 100% at 500 µg/ml NM ($p < 0.001$).

Conclusion:

Our results suggest that the nutrient mixture (NM) is an excellent candidate for therapeutic use in the treatment of bladder cancer, by inhibiting critical steps in

