



Anti-Atherogenic Effects of a Mixture of Ascorbic Acid, Lysine, Proline, Arginine, Cysteine and Green Tea Phenolics in Human Aortic Smooth Muscle Cells (2003)

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Abstract

Introduction:

Naturally occurring compounds demonstrate wider spectra of biological activity and fewer side effects than synthetic drugs. A mixture of natural compounds often produces synergistically enhanced therapeutic action. Supplementation with ascorbic acid (AsA) has been proposed as a preventive measure to the development of atherosclerosis. Moreover, a number of studies revealed cardio-protective effects of chronic tea consumption.

Objective:

We investigated whether effects of ascorbic acid could be enhanced by supplementation with Nutrient Synergy (NS) a nutrient mixture containing AsA, epigallocatechin gallate (EGCG) from green tea extract, lysine, proline, arginine, N-acetyl cysteine (molar ratio 1-0.2-1.2-1.2-0.5-0.2, respectively).

Methods:

The effects of NS were investigated in cultured human aortic smooth muscle cell (SMC). Cell growth rate was measured by DNA synthesis and cell number count. Cell invasiveness was assayed with Matrigel-covered membranes. Matrix metalloproteinase-2 (MMP-2) expression was measured by zymography. Secretion of monocyte chemoattractant protein-1 (MCP-1) and interleukin-6 (IL-6) by SMC was monitored using ELISA kits.

Results:

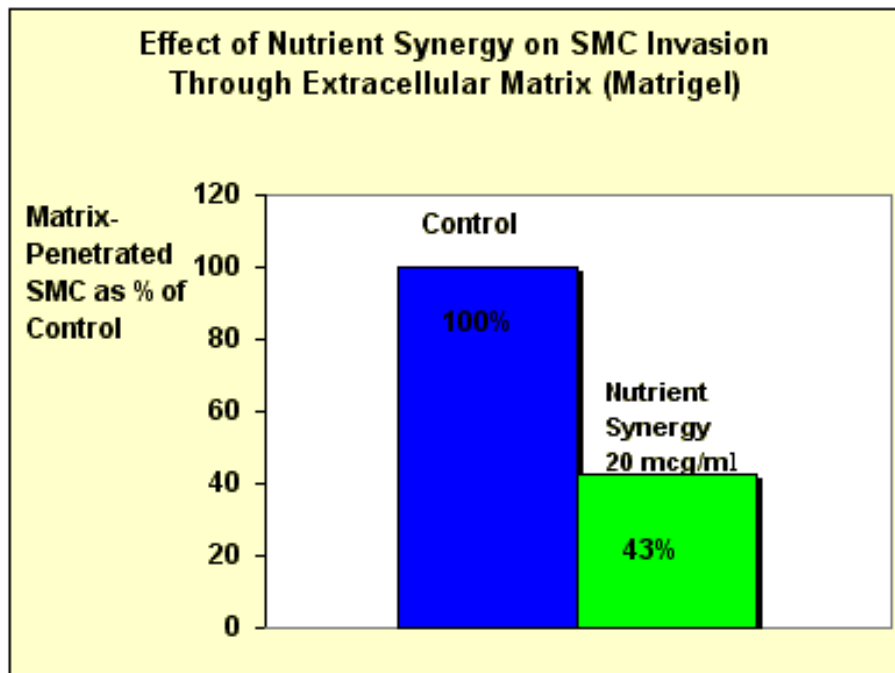
Fetal serum-stimulated growth of SMC was inhibited by 48% at 30 µg/ml NS. Corresponding concentrations of AsA (30 µM) or EGCG (6 µM), the most active tea phenolics, produced only a minor effect (< 10% change) on SMC growth. SMC invasion was inhibited by 57% at 20 µg/ml NS. This was accompanied by significant decrease in MMP-2 expression. NS at 100 µg/ml inhibited secretion of MCP-1 and IL-6 by 65% and 47%, respectively.

Conclusions:

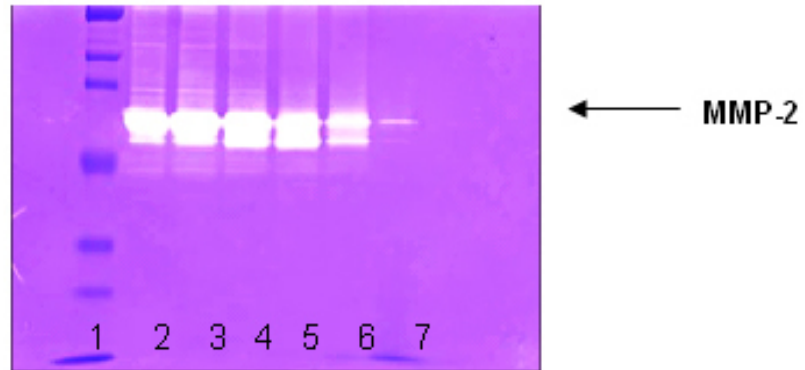
The specific mixture of AsA, green tea phenolics and selected amino acids has a strong potential in preventing atherogenic responses of SMC to pathogens.

Comment:

In this study, the synergistic anti-atherogenic effects of nutrients such as ascorbic acid, lysine, proline, arginine, cysteine, and epigallocatechin gallate (from green tea extract) were investigated in cultured human aortic smooth muscle cell (SMC) by measuring SMC growth rate, invasiveness, matrix metalloproteinase-2 (MMP-2) expression, and secretion of monocyte chemoattractant protein-1 (MCP-1) and interleukin-6 (IL-6). By inhibiting the atherogenic response of vascular smooth muscle cells to pathological stimuli, Nutrient Synergy blocks the development of atherosclerotic lesions.



Inhibition of SMC invasion by Nutrient Synergy was accompanied by a significant decrease in MMP-2 expression.



1 – Markers, 2-Control, 3-7 NS 10, 50, 100, 500, 1000 µg/ml NS