



Nutrient Synergy – A Mixture of Ascorbic Acid, Lysine, Proline, Arginine, Cysteine and Green Tea Extract Suppresses Autocrine Inflammatory Response in Cultured Human Aortic Smooth Muscle Cells (2003)

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Abstract

Introduction:

Recognition of the involvement of inflammatory processes into initiation, development and pathological consequences of atherosclerotic lesion initiated a search for the effective cure. 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.

Objective:

This prompted us to investigate whether Nutrient Synergy (NS), a proprietary mixture containing ascorbic acid (AsA), lysine, proline, arginine, N-acetyl cysteine and tea phenolics (molar ratio 1-1.2-1.2-0.5-0.2-0.2 (latter calculated for epigallocatechin gallate content), respectively) could reduce an autocrine response of human aortic smooth muscle cell (SMC) to inflammatory stimuli.

Methods and Materials:

Cultured SMC were challenged with tumor necrosis factor-alpha (TNF-?) or lipopolysaccharide (LPS) in the presence or absence of NS. Expression of leading mediators of inflammatory reaction was assayed with ELISA (R&D Systems).

Results:

LPS-induced SMC secretion of caspase-1 (activator of pro-interleukin-1?) was completely reversed in the presence of Nutrient Synergy. Secretion of pro-interleukin-1 beta by SMC challenged with TNF-? was reversed and dramatically inhibited in the presence of 20 mcg/ml NS, showing enhanced inhibition from the synergistic effect of low levels of ascorbic acid (20 µM) and EGCG (3 µM). Significant inhibition was seen in 10mcg/ml (30 µM) epigallocatechin gallate (EGCG) and some inhibition was seen with 25mcg/ml (40 µM) ascorbic acid (AsA). Induction of interleukin-1 beta secretion by SMC challenged with LPS was

completely reversed in the presence of NS. 2.5-fold induction of interleukin-1 alpha by SMC challenged with LPS, was completely reversed in the presence of 20 mcg/ml NS. Induction of interleukin-6 secretion by SMC challenged with TNF- α was completely reversed in the presence of NS. Induced smooth muscle cell secretion of monocyte chemoattractant protein (MCP-1), which leads to migration of monocytes into the atherosclerotic plaque, was almost completely reversed in the presence of 100 mcg/ml of NS. Secretion of sP-selectin (monocyte adhesive mediator) by smooth muscle cells challenged with TNF- α and LPS, was inhibited by 40% and 30% respectively in the presence of NS.

Conclusions:

Anti-inflammatory effects of NS exceeded the sum of actions of its individual components. Data confirms that Nutrient Synergy, a mixture of ascorbic acid, tea phenolics, and selected amino acids, has strong inhibitory potential against vascular cell inflammatory responses to pathogenic stimuli.

Comment:

It is recognized that inflammatory processes are involved in the initiation, development and pathological consequences of atherosclerotic lesions. This study demonstrated that Nutrient Synergy, a mixture of ascorbic acid, tea phenolics, and selected amino acids, has a strong inhibitory potential against vascular cell inflammatory responses to pathogenic stimuli in human aortic smooth muscle cell culture. These results suggest that such a nutrient mixture has therapeutic potential in suppressing atherogenic inflammatory responses.

Nutrient Synergy was found to significantly inhibit activated smooth muscle cell secretion of all inflammatory mediators shown in the diagram below

