



Natural nutrient mixture effectively reduces collagen matrix contraction driven by human uterine smooth muscle cells.

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Aim:

Abnormal uterine myometrial contractility causes preterm delivery, contributing to perinatal morbidity and mortality. Disturbances in hormonal regulation and inflammation-related processes have been attributed a role in the pathophysiological mechanisms of uterine contractility. We investigated the effects of natural nutrients on uterine tissue contractility in vitro.

Methods:

We used an in vitro model of collagen I gel contraction driven by embedded cultured human uterine smooth muscle cells (SMC). The effects of tested compounds were evaluated using their capacity to affect gel contraction (measured by reduction in gel area during 24-h incubation in serum free medium). Cellular expression of matrix metalloproteinases (MMP) was followed by gel zymography.

Results:

Collagen gel contraction driven by uterine SMC was significantly stimulated by potassium chloride, pituitary hormone oxytocin and by inflammatory cytokine alpha-tumor necrosis factor (TNF-alpha). Accelerated gel contraction was accompanied by elevated secretion of MMP-2 and MMP-9 into cell culture media. Among a variety of purified bioflavonoids and polyphenol-enriched plant extracts tested for their ability to counteract uterine SMC-dependent collagen gel contraction, the strongest effects were demonstrated by epigallocatechin gallate and green tea leaf extract, respectively. The addition of ascorbic acid and the amino acids lysine, arginine, cysteine and proline to green tea extract further increased its effectiveness. A reduction in gel contraction correlated with decreased MMP expression.

Conclusion:

Based on these findings, we found that nutrients can effectively counteract uterine myometrial contraction and MMP activity in vitro, suggesting that pathophysiological mechanisms of abnormal uterine myometrial contractility can be counteracted by a combination of naturally occurring nutrients. These mechanisms might involve extracellular matrix remodeling.

