

A Prospective, Randomized, Double Blind Study to Evaluate the Effects of Orally Administered Adenosine Triphosphate on Peripheral Perfusion Pressure in Adult Men and Women

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Abstract

Context: Peripheral arterial disease (PAD) is the most common manifestation of systemic atherosclerosis whereby the arterial lumen of the extremities becomes progressively narrowed by atherosclerotic plaque. Preclinical research demonstrated peripheral vasodilatation and increased peripheral arterial oxygenation in animals after oral treatment with adenosine triphosphate (ATP). We hypothesized that oral administration of pharmacologically active purines, such as ATP, are able to modify purine metabolism in vivo and regulate physiological parameters known to be under the control of purinoceptors.

Objective: To evaluate the acute effect of a single oral dose of ATP on peripheral perfusion pressure and oxygenation in healthy adult men and women at a single time point of one hour after dosing.

Methods: This prospective, double-blind, placebo-controlled, crossover trial randomized twelve healthy adults to each of three 1-day treatment periods: ATP 100 mg, ATP 250 mg and placebo (7-day washout between periods). Arterial systolic pressure, pulse oximetry measurements, and electrocardiogram were obtained at baseline and one hour after dose administration.

Results: Eleven subjects completed the study (6 women, 5 men; mean age 49.7 years). An inter-group analysis revealed no significant differences between any of the three treatments. The intra-group analysis revealed no significant differences with placebo treatment; however, a significant ($p=0.03$) increase in brachial arterial pressure of 6.45 ± 8.12 mmHg, a significant ($p=0.048$) increase in ankle arterial pressure of 4.45 ± 6.55 mmHg and a significant ($p=0.03$) increase in upper extremity oximetry of 1.36 ± 1.75 % with the ATP 100 mg treatment; and a significant ($p=0.03$) increase in brachial arterial pressure of 3.83 ± 5.27 mmHg with the ATP 250 mg treatment were noted when one hour post treatment measurements were compared to baseline. No adverse events were reported.

Conclusions: The results suggest that a single oral dose of ATP 100 mg and ATP 250 mg will effectively increase upper extremity perfusion pressure over a one-hour period. Oral administration of ATP 100 mg also demonstrated a concomitant increase in upper extremity oxygenation and an increase in lower extremity perfusion pressure. Although this pilot trial is limited by a small sampling of healthy adult subjects without PAD, these findings suggest that oral administration of ATP may be a safe and effective treatment to increase peripheral perfusion pressure and oxygenation in patients with PAD.