

## Clinical Nutrition 2019: Preclinical and clinical studies with tomato carotenoids to balance blood pressure and skin health- Yoav Sharoni- Ben Gurion University of the Negev

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### Abstract

Oxidative stress is implicated within the pathogenesis of hyperpigmentation, a risk factor for cardiovascular morbidity and mortality. Several human studies have shown that tomato carotenoids can affect various aspects of human health. During this presentation the author will address two issues: a) balancing the response of skin cells to UV irradiation and b) the reduction of elevated vital signs. a) Several human studies have shown that tomato carotenoids can reduce UV-induced damage by reducing erythema and improving the balance between collagen production and breakdown. We hypothesized that a mixture of tomato carotenoids alongside polyphenols might yield better skin protection than that expected from summation of their activity. Truly, we understood that mixtures of tomato nutrient complex (containing lycopene) with rosemary extract (containing the polyphenol carnosic acid) synergistically reduced inflammatory markers and induced antioxidant activity in skin cells prominent to discount of Matrix Metalloproteinase (MMPs) and thus may reduce collagen breakdown and delay skin ageing. b) Hyperpigmentation may be a risk factor for cardiovascular morbidity and mortality. We performed a dose-response analysis to uncover the optimal effective dose of a tomato nutrient complex supplement in maintaining normal signs among hypertensive individuals.

To trial carotenoid bioavailability, helpers were given treatment for four weeks along with TNC by providing 2, 5 or 15 mg lycopene. The upsurge in blood stages of lycopene, phytoene, and phytofluene was dose dependent. Consequences propose that only carotenoid levels attained by the TNC dose of 15 mg lycopene or higher correlate to a valuable effect on SBP in hypertensive subjects while lower doses and lycopene alone do not. Outcomes designate that by giving treatment for 8 weeks with tomato nutrient complex consistent to comprise 15 mg or 30 mg of lycopene was related to significant reductions in systolic vital sign.

Treatment with lower dose or treatment with 15 mg of synthetic lycopene as a standalone didn't show an enormous effect. To check carotenoid bioavailability, volunteers were treated for four weeks with TNC providing 2, 5 or 15 mg lycopene. The rise in blood levels of lycopene, phytoene, and phytofluene was dose dependent. The human bioavailability of the most tomato carotenoids lycopene, phytoene and phytofluene was dose-dependent following treatment with different doses of the tomato nutrient complex.

Tomato Nutrient Complex, a proprietary tomato extract, was supplied by Lycored Ltd., Beer Sheva, Israel at doses like 5, 15 and 30 mg lycopene. Lycored also provided identically eyeing capsules with 15 mg synthetic lycopene (18–20% cis isomers) and placebo capsules containing soybean oil.

Sample size calculations were performed by using appropriate formulas based on 80% power and a two-sided  $\alpha = 0.05$  with assumption of a standard deviation of DBP equal to 3.8 mmHg. A clinically significant difference in DBP was determined at 3.0 mmHg. For the grit, the model size was 26 patients in each usage arm—in all, 130 participants.

The paired t-test or non-parametric signed-rank test was applied for testing the differences of the continuous assessments between all visits to the baseline. An ANOVA ideal consuming the Duncan method was smeared for testing the alterations in blood pressure changes between all study groups. Altogether examinations practical were two-tailed, and a p-value of 5% or less was measured statistically important. The data were analyzed using the SAS® version 9.1 for Windows (SAS Institute, Cary, North Carolina). The lost data for initial extractions who were not substituted and who joined at smallest four weeks of the double-blind placebo-controlled phase of the study were handled as LOCFs (last observation carried forward). 61 patients with BP values in the choice of  $130 < SBP < 145$  mmHg or  $80 < DBP < 95$  mmHg were registered in the training and began treatment with a

# Journal of Nutritional Disorders & Therapy

four-week single-blind placebo run-in phase. These patients were randomized for the double-blind placebo-controlled treatment phase. At registration, there remained 12 topics in each of the subsequent arms: TNC 5 mg, TNC 15 mg, synthetic lycopene 15 mg and placebo, in addition to 13 subjects in the TNC 30-mg arm. 46 subjects accomplished the eight-week action period and 15 (3 in each arm) released out of the study prematurely. There stood neither contrary effects stated throughout the whole study old-fashioned nor any significant changes in glucose, urea, creatinine, uric acid, sodium, potassium, chloride, cholesterol, triglycerides, AST, ALT, ALP, LDH, HDL, LDL levels, or in the blood count parameters.

The treatment arms were comparable with respect to all demographic and baseline characteristics. Baseline SBP and DBP measurements were not statistically significantly different. The mean age was  $52.4 \pm 8.2$  years, and 73.8% were male. The mean SBP and DBP were  $135.2 \pm 7.4$  mmHg and  $82.0 \pm 11.7$  mmHg, respectively. There remained no statistically noteworthy alterations between the five arms in the baseline plasma lycopene concentrations; however, the mean concentration of the TNC 15-mg arm was somewhat higher than the other arms.

One elucidation for the inferior effectiveness of the synthetic lycopene is the existence of other active nutrients in the tomato extract preparation. Certainly, in a preceding study, we initiate that the anti-cancer effects of carotenoids and other phytonutrients present in tomato extract (e.g., lycopene, phytoene and phytofluene) resides in their combined movement that is synergistically advanced than the action of each compound alone. To measure the possible influence of additional tomato ingredients to the BP-lowering effect, we analyzed the bioavailability of these carotenoids following treatment with different doses of TNC in a group of 25 healthy volunteers. Although the characteristics of these volunteers are different from those of the participants of the BP study, the information about the differences in the dose-response of the three major tomato carotenoids can shed light on the consequences of the BP study, as deliberated. The upsurge in blood stages of lycopene, phytoene and phytofluene was quantity reliant on, and was significantly higher with TNC 15 mg as compared to TNC 5 mg. A great growth in plasma attentions of lycopene, phytofluene, and phytoene was previously obvious after two weeks of treatment.

NC containing 15 mg and 30 mg lycopene was well tolerated and showed efficacy in reducing SBP in the HT population, while lower doses and standalone pure lycopene were not sufficient to induce similar effects.

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