High Lycopene Tomato Production and Evaluation of Effects of its Consumption on Human Plasma Lycopene Levels and Oxidative Damage

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Emerging evidence suggests that tomatoes (lycopene) have the potential to improve the health status the U.S. population. Enhancement of lycopene intake is potentially possible through the development and distribution of a high lycopene tomato. We have recently produced such a tomato and propose to test its efficacy through the elevation of plasma lycopene levels and/or reduction in oxidative damage. Using a randomized, cross-over controlled feeding study in 40 adults, we hypothesize that daily consumption of high lycopene as compared to a standard fresh tomato will result in 1) a significant elevation in plasma lycopene levels and 2) a significant reduction in oxidative damage biomarkers among smoking and non-smoking adults. Our objectives are: 1) to provide fresh standard tomatoes or high lycopene tomatoes by manipulating the hycroponic nutrient solution EC, 2) to assess/monitor lycopene content and ORAC response of fresh tomatoes used in study intervention, 3) to measure plasma lycopene, related carotenoids, 8-epi-prostaglandin F2-alpha as a biomarker of lipid peroxidation and 8-OHdG as a biomarker of DNA oxidative damage at four separate timepoints, and to publish and disseminate study findings. This research represents a unique, multidisciplinary approach to test the human biological response to consumption of a high lycopene tomato that is being produced through a cost-effective and easily adaptable greenhouse method. This collaborative research effort of plant sciences, applied nutritional sciences and translational public health sciences affords a unique opportunity to expand collaborative food-related research in the future. (Pending research project submitted to USDA NRI)

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