

Relationship of Tomato Intake Amount Recommended in MyPlate to Cardiovascular Disease Risk Reduction

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Background

To make vegetable intake more achievable, the 2010 Dietary Guidelines Advisory Committee created the Red and Orange vegetable subgroup for the USDA Food Pattern. The formation of the new subgroup was designed in part to “provide more focus on tomatoes, ... as a vegetable choice in recognition of its nutrient contributions.” The new subgroup was incorporated into the USDA Food Pattern, which serves as the basis for USDA’s MyPlate recommendations. The weekly Red and Orange vegetable intake goal for a 2000 kcal diet is 5.5 cups/week (0.79 cup/d), composed of 82% tomatoes, making the Red and Orange subgroup and tomatoes the largest by volume subgroup and single vegetable, respectively, recommended in MyPlate.

Tomatoes are the primary dietary lycopene source in the American diet and intakes of tomatoes and/or lycopene are inversely correlated with chronic disease risk.¹⁻⁴ The increase in serum lycopene that resulted when participants consumed an amount of tomatoes similar to the MyPlate recommendation was reported previously,⁵ but the potential impact on disease risk reduction has not been modeled.

Purpose

The purpose of this study was to use the previously documented upward shift of one quartile in serum lycopene, caused by consuming an amount similar to the MyPlate-recommended tomato intake, to estimate the disease risk reduction potentiated by this upward shift.

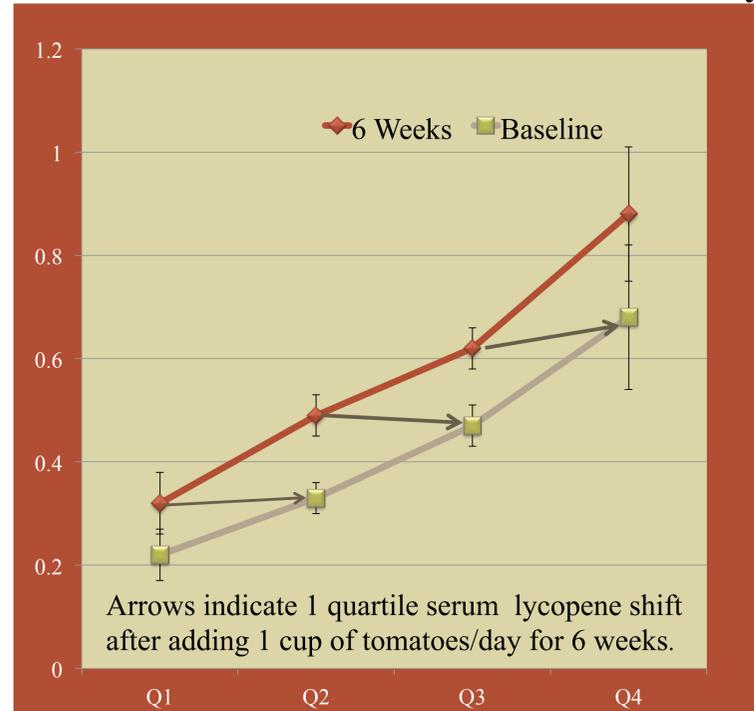
Methods

As previously reported, 58 men and women (ages 35 – 70, BMI 27 – 37) were asked to consume 1 cup equivalent canned tomatoes, sauce, or paste as part of their usual daily diet for six weeks. Participants’ actual reported consumption was 1.1 cup equivalents/d. At baseline and at 6 weeks, serum lycopene was measured and found to have shifted upward by one quartile. In the current study, we examined changes in cardiovascular disease (CDV) risk associated with lycopene concentration quartiles reported in population studies. Three studies reporting serum lycopene quartiles and corresponding CVD risk were identified.

Supported by ConAgra Foods, Inc.

Results

Median(sd) Lycopene (µg/ml) by Quartile at Baseline and 6 Weeks in the Current Study



Lycopene concentrations and the magnitude of inter-quartile change in lycopene concentration varied widely among the population studies and tended to be greatest in all groups between Q1 and Q2. (Data not shown.) Relative risk of total CVD in women¹ decreased 22% from Q1 to Q2 and 52% when angina was excluded. Stroke outcomes³ hazard risk decreased 42% between Q1 and Q2. Coronary events and stroke combined⁴ showed a 3.3-fold greater risk in Q1 vs. other quartiles.

Cardiovascular Risk Reduction by Quartile of Lycopene Concentration in Population Studies

	Outcome Measured	Risk Reduction Q2 vs. Q1	Risk Reduction Q3 vs. Q2	Risk Reduction Q4 vs. Q3
Sesso ¹	Total CVD	22%	22%	-6%
	CVD Excluding Angina	52%	0%	0%
Karppi ³	Any Stroke	42%	1%	12%
Rissanen ⁴	Coronary Event and Stroke	Q1 had 3.3 times greater risk vs. other quartiles		

P < 0.05 for all trends

Conclusions

This analysis shows a general trend for reduced CVD and stroke risk with increased tomato intake reflected by increased serum lycopene concentrations and was most marked between lowest intakes and all others. A lycopene concentration shift of one quartile, which was observed when participants changed from usual tomato intake to an amount approximating the MyPlate recommended amount, was associated with decreased risk of CVD and stroke, especially in those with lowest initial intakes.

References

- Sesso HD, Buring JE, Norkus EP, Gaziano JM: Plasma lycopene, other carotenoids, and retinol and the risk of cardiovascular disease in women. *Am J Clin Nutr* 2004, 79:47-53.
- Jacques PF, Lyass A, Massaro JM, Vasan RS, D'Agostino RB, Sr.: Relationship of lycopene intake and consumption of tomato products to incident CVD. *Br J Nutr* 2013, 110:545-551.
- Karppi J, Laukkanen JA, Sivenius J, Ronkainen K, Kurl S: Serum lycopene decreases the risk of stroke in men: A population-based follow-up study. *Neurology* 2012, 79:1540-1547.
- Rissanen TH, Voutilainen S, Nyyssonen K, Lakka TA, Sivenius J, Salonen R, Kaplan GA, Salonen JT: Low serum lycopene concentration is associated with an excess incidence of acute coronary events and stroke: the Kuopio Ischaemic Heart Disease Risk Factor Study. *Br J Nutr* 2001, 85:749-754.
- Reimers K, Andon M, Jacobson M, Nguyen V, Cooper L, Rippe J: Increasing tomato intake to MyPlate recommended amount: effect on serum lycopene. *FASEB Journal* 2013, 27:628.624.