

Lycopene concentration and antioxidant capacity after consuming tomatoes with olive oil

JM Fielding¹, D Li¹, R Stockmann², AJ Sinclair¹

¹Department of Food Science, RMIT University, Melbourne, Victoria, 3001

²Food Science Australia, Werribee, Victoria, 3030

Lycopene is a carotenoid found in high concentrations in tomatoes and tomato products and it is the most efficient singlet oxygen quencher of all the carotenoids (1). High lycopene concentrations have been found to be protective against myocardial infarction (2). Consumption of tomato juice, tomato paste and fresh tomatoes with corn oil or olive oil, increases plasma/ serum lycopene concentrations (3,4), although it is not known if this increase is associated with increased antioxidant capacity of the plasma.

This study examined plasma lycopene concentrations after a 9 d dietary intervention where tomatoes were cooked with extra virgin olive oil. Subjects (n = 10) were aged between 20–35 yr, of Anglo Celtic origin and in good health. They completed a 5 d diet avoiding dietary sources of lycopene, then consumed 4 tomato meals on consecutive days: two on the first and one on each of the second and third days. Each tomato meal contained 500 g of tomatoes and 20 mL of extra virgin olive oil. Fasting blood samples were taken at baseline, 24 h after the completion of a low lycopene diet, the morning following the two lycopene meals and 24 h after the third and fourth meals. Plasma carotenoids and vitamin E were measured using HPLC. The antioxidant capacity of the plasma was measured by ORAC, TBARS and a singlet oxygen assay.

Results indicated that avoiding foods containing lycopene led to a significant decrease in total plasma lycopene. Results also showed a significant increase in plasma total lycopene, *trans*-lycopene and *cis*-lycopene concentrations, when tomatoes were cooked and consumed with olive oil. There was no change in antioxidant capacity of the plasma as assessed by the ORAC assay, which assesses peroxy radical scavenging ability.

	<i>trans</i> -Lycopene ¹	<i>cis</i> -Lycopene ¹ (µg/100 mL plasma)	Total Lycopene ¹
Baseline	20.39 ± 3.62	12.51 ± 2.47	31.88 ± 6.10
Avoiding lycopene	11.80 ± 1.94	8.67 ± 1.44	20.45 ± 3.347
2 meals	19.79 ± 2.37	13.45 ± 1.37	33.33 ± 3.53
4 meals	18.92 ± 2.44	11.98 ± 1.18	32.26 ± 2.64
P-value	0.0033	0.0359	0.0084

¹mean ± SEM.

1. DiMasco P, Kaiser S, Sies H. Lycopene is the most efficient biological carotenoid singlet oxygen quencher. Arch Biochem Biophys 1989; 274: 532–538.
2. Kohlmeier I, Kark JD, Gomez-Gracia E, and the Euramic study group. Lycopene and myocardial infarction risk in the Euramic Study. Am J Epidemiol 1997; 146: 618–626.
3. Gartner C, Stahl W, Sies H. Lycopene is more bioavailable from tomato paste than from fresh tomatoes. Am J Clin Nutr 1997; 66: 116–122.
4. Fielding JM, Rowley KG, Cooper P, O'Dea K. Addition of olive oil to processed tomatoes increases plasma lycopene responses to dietary lycopene. Proc Nutr Soc Aust 1998; 22: 280.