

## Increased dietary and circulating lycopene are associated with reduced prostate cancer risk: a systematic review and meta-analysis.

Rowles JL 3rd<sup>1</sup>, Ranard KM<sup>1</sup>, Smith JW<sup>1</sup>, An R<sup>2</sup>, Erdman JW Jr<sup>1,3</sup>.

### Author information

- 1 Division of Nutritional Sciences, University of Illinois at Urbana-Champaign, Urbana, IL, USA.
- 2 Department of Kinesiology and Community Health, University of Illinois at Urbana-Champaign, Urbana, IL, USA.
- 3 Department of Food Science and Human Nutrition, University of Illinois at Urbana-Champaign, Urbana, IL, USA.

### Abstract

**BACKGROUND:** Prostate cancer (PCa) is the fifth leading cause of cancer-related deaths worldwide. Many epidemiological studies have investigated the association between prostate cancer and lycopene, however, results have been inconsistent. This study aims to determine the impact of dietary and circulating concentrations of lycopene on PCa risk and to investigate potential dose-response associations.

**METHODS:** We conducted a systematic review and dose-response meta-analysis for the association between dietary and circulating lycopene and PCa risk. Eligible studies were published before 1 December 2016 and were identified from PubMed, Web of Science and the Cochrane Library. We estimated pooled relative risk ratios (RR) and 95% confidence intervals (CI) using random and fixed effects models. Linear and nonlinear dose-response relationships were also evaluated for PCa risk.

**RESULTS:** Forty-two studies were included in the analysis, which included 43 851 cases of PCa reported from 692 012 participants. Both dietary intake (RR=0.88, 95% CI: 0.78-0.98, P=0.017) and circulating concentrations (RR=0.88, 95% CI: 0.79-0.98, P=0.019) of lycopene were significantly associated with reduced PCa risk. Sensitivity analyses within the dose-response analysis further revealed a significant linear dose-response for dietary lycopene and PCa risk such that PCa decreased by 1% for every additional 2 mg of lycopene consumed (P=0.026). Additionally, PCa risk decreased by 3.5 to 3.6% for each additional 10  $\mu\text{gdl}^{-1}$  of circulating lycopene in the linear and nonlinear models respectively ( $p_{\text{linear}}=0.004$ ,  $p_{\text{nonlinear}}=0.006$ ). While there were no associations between lycopene and advanced PCa, there was a trend for protection against PCa aggressiveness (RR=0.74, 95% CI: 0.55-1.00, P=0.052).

**CONCLUSIONS:** Our data demonstrate that higher dietary and circulating lycopene concentrations are inversely associated with PCa risk. This was accompanied by dose-response relationships for dietary and circulating lycopene. However, lycopene was not associated with a reduced risk of advanced PCa. Further studies are required to determine the mechanisms underlying these associations.