Lycopene modulates growth and survival associated genes in prostate cancer.

Rafi MM, Kanakasabai S, Reyes MD, Bright JJ.
Department of Food Science, School of Environmental and Biological Sciences, Rutgers, The State University of New Jersey, New Brunswick, NJ08901, USA.

Abstract
Lycopene is a fat soluble red-orange carotenoid pigment present in tomato that reduces the risk for prostate cancer, a common malignancy among men. However, the mechanism by which lycopene attenuates prostate cancer is not fully defined. In this study we examined the effect of lycopene on proliferation, survival, and biomarker gene expression in prostate cancer (PC-3) cells in culture. WST-1 assay showed that lycopene induces a biphasic effect on PC-3 cells with a modest increase in proliferation at 1-5 μM, no change at 10-25 μM and a decrease at 50-100 μM doses in culture. Interestingly, combination treatment with lycopene induced anti-proliferative effect of Temozolomide on PC-3 cells. Lycopene also augmented the anti-proliferative effect of peroxisome proliferator-activated receptor gamma (PPARγ) agonists, but not Doxorubicin or Taxol, in prostate cancer. Flow cytometry analyses showed that lycopene, in combination with chemotherapeutic agents and PPARγ agonists, induced modest cell cycle arrest with significant increase in cell death by apoptosis and necrosis on prostate cancer. Gene array and quantitative reverse transcription polymerase chain reaction analyses showed that lycopene alters the expression of growth and apoptosis associated biomarkers in PC-3 cells. These findings highlight that lycopene attenuates prostate cancer by modulating the expression of growth and survival associated genes.