

Cancer Chemoprevention: Prevention is Better than Cure

Rajendra Sharma*

Department of Molecular Biology and Immunology, University of North Texas, USA

Cancer is one of the major causes of morbidity and mortality throughout the world. Carcinogenesis is a multistep molecular process induced by genetic and epigenetic changes that disrupt pathways controlling cell proliferation, apoptosis, differentiation, and senescence [1,2]. Therefore, several diverse approaches are required for the treatment and management of cancer which include radiation, chemotherapy, and surgical removal of malignant tissues.

Consistent with the old English proverb “*Prevention is better than cure*”, one of the multifactorial approaches to our fight against this dreaded disease is based on prevention of the disease through use of non-toxic dietary supplements, micronutrients and natural compounds. This approach is generally referred to as “chemoprevention” that is defined as the use of natural or synthetic agents that reverse, inhibit, or prevent the development of cancer. Thus the major goal of chemoprevention is to delay the onset of cancer as well as decrease its incidence. An effective chemoprevention requires the use of non-toxic agents that inhibit specific molecular steps in the carcinogenic pathway. It has been advocated that vegetarian diet may be an important source of cancer-inhibiting bioactive phytochemicals [3]. Although these compounds are generally viewed as non-essential for normal body functioning, an increasing number of them have been shown to possess biological activity relevant to disease-fighting and prevention of cancer. Interestingly, a number of population based studies indicate that people in South East Asian countries have much lower risk of developing colon, prostate, breast, lung and other cancers as compared to their Western counterparts. It has been suggested that constituents of their diet such as garlic, ginger, soy, turmeric, onion, tomatoes, cruciferous vegetables and green tea play a significant role in cancer prevention. Recognition of such an importance of diet in cancer prevention has finally lead to an accelerated pace of research in the area of chemoprevention. A number of bioactive compounds have been isolated from garlic, turmeric and cruciferous vegetables which showed significant potential to inhibit carcinogenesis. For example, diallyl disulfides present in garlic [4], isothiocyanates (such as sulforaphane) [5] from cruciferous vegetables, and curcumin [6] isolated from the turmeric have been shown to inhibit growth of various cancer cells types including prostate, breast, lung, colon and leukemia and skin [7]. During late 70s Wattenberg’s research group demonstrated that dietary chemicals including phenolic antioxidants can significantly inhibit chemical induced carcinogenesis in laboratory animals [8]. Studies conducted during last four decades have shown that both natural and synthetic chemopreventive agents essentially inhibit carcinogenesis by two major mechanisms 1) inhibition of carcinogen activation and 2) induction of xenobiotic metabolizing enzymes that protect from the toxic effects of environmental chemicals [9]. Besides these, other molecular targets shown to be inhibited by chemopreventive agents in cancer cells are: a) the proteins involved cell cycle progression and proliferation b) anti-apoptotic proteins c) drug transport, MDR, MRP

d) growth factor pathway e) NF-kB activation pathway f) Angiogenesis g) inflammatory proteins such as COX-2 [3-9].

In this Special issue of the Journal of Cancer Science and Therapy on the Chemoprevention of Cancer we have included authoritative Reviews on the chemoprevention of prostate and colorectal cancer as well as original articles describing the efficacies of natural and synthetic chemopreventive agents in inhibition of prostate, lung and acute promyelocytic leukemia. These articles will not only benefit the researchers and clinicians working in this field but also to other scientists interested in exploring the significance of dietary supplements in the prevention of cancer. It is high time to appreciate the fact that economic burden associated with the treatment and management of cancer is huge and prevention of this disease by diet and dietary supplements is important to offset this burden. Basic and clinical research studies have already demonstrated the efficacy of chemopreventive agents in protection against cancer and other chronic diseases. Therefore, it is high time to channelize resources in this direction.

References

1. López-Lázaro M (2010) A new view of carcinogenesis and an alternative approach to cancer therapy. *Mol Med* 16: 144-153.
2. Jaffe LF (2003) Epigenetic theories of cancer initiation. *Adv Cancer Res* 90: 209-230.
3. Huber MH, Lee JS, Hong WK (1993) Chemoprevention of lung cancer. *Semin Oncol* 20: 128-141.
4. Conaway CC, Yang YM, Chung FL (2002) Isothiocyanates as cancer chemopreventive agents: their biological activities and metabolism in rodents and humans. *Curr Drug Metab* 3: 233-255.
5. Singh AV, Xiao D, Lew KL, Dhir R, Singh SV (2004) Sulforaphane induces caspase-mediated apoptosis in cultured PC-3 human prostate cancer cells and retards growth of PC-3 xenografts *in vivo*. *Carcinogenesis* 25: 83-90.
6. Fahey JW, Zhang Y, Talalay P (1997) Broccoli sprouts: an exceptionally rich source of inducers of enzymes that protect against chemical carcinogens. *Proc Natl Acad Sci U S A* 94: 10367-10372.
7. Fleischauer AT, Arab L (2001) Garlic and cancer: a critical review of the epidemiologic literature. *J Nutr* 131: 1032S-1040S.
8. Aggarwal BB, Kumar A, Bharti AC (2003) Anticancer potential of curcumin: preclinical and clinical studies. *Anticancer Res* 23: 363-398.
9. Surh YJ (2003) Cancer chemoprevention with dietary phytochemicals. *Nat Rev Cancer* 3: 768-780.

*Corresponding author: Rajendra Sharma, PhD, Department of Molecular Biology and Immunology, University of North Texas, Fort Worth, Texas, USA, Tel: 817 735 2140; Fax: 817 735 2118; E-mail: sharmarajendra@hotmail.com

Received January 09, 2012; Accepted January 11, 2012; Published January 13, 2012

Citation: Sharma R (2012) Cancer Chemoprevention: Prevention is Better than Cure. *J Cancer Sci Ther* S3:e001. doi:[10.4172/1948-5956.S3-e001](https://doi.org/10.4172/1948-5956.S3-e001)

Copyright: © 2012 Sharma R. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.