

Research and Reviews : Journal of Medical and Health Sciences

CHEMOTHERAPY AND CURATIVE APPROACHES TO CANCER

Neha Anand*

Department of Biotechnology, Majhighariani Institute of Technology and Science, Orissa, India.

Short Commentary

Received :07/05/2015

Revised : 20/05/2015

Accepted :10/06/2015

*For Correspondence

Neha Anand, Department of Biotechnology, Majhighariani Institute of Technology and Science, Odisha, India,
Email: nehaanandnv@gmail.com

Keywords: Chemotherapy, Cancer, Immune system, Chemoprevention

INTRODUCTION

Cancer is a class of disease also known as “malignancy” characterized by uncontrolled growth of abnormal cells. This uncontrolled growth of abnormal cells can result to death. Cancer is the one of the second major cause of death in the worldwide [1]. Cancers are of more than 100 types. It is observed that there is difference in the risk of different types of cancer based on geographical area. External factors (different types of chemicals, UV radiation, harmful organisms) and internal factors (different types of hormones, internal mutations, immune conditions resulting from metabolism) both cause cancer. It is considered that developed country is affecting more in from cancer in comparison to developing countries. This may be due to the lifestyle or environment.

WHAT IS CHEMOTHERAPY?

Chemotherapy is used for cancer treatment, in which drugs are used, that drugs are especially anti-cancer drugs. It harms cells which are dividing rapidly in normal conditions also. In this we can use on drug at a time which is known as single agent chemotherapy or we can use different types of drugs at once which is called combination chemotherapy. The main aim of this is to inhibit the growth of cancer cells as well as to decrease its incidence. An effective chemotherapy requires the use of non-toxic agents that inhibit specific molecular steps in the carcinogenic pathway. Biomarkers play an important role in diagnosis and prognosis of the cancer [2]. Chemotherapy-induced peripheral neuropathy is a dose-limiting effect of cancer therapy.

Role of Immune Systems against Tumor

Immune system activates cell mediated response and humoral immune response. These cells play important role in protecting from cancer cells. Cell mediated immune system protects the body by controlling cancerous cells, which includes Cytotoxic T Lymphocytes activation , Macrophages, Lymphokines, Dendritic Cells, Natural Killer cells, etc, along with this humoral immune system recognizes foreign particles [3].

Natural Products & Cancer Chemoprevention

By use of natural products also we can do cancer chemoprevention. It is found that vegetarian diet may be a best source for cancer-inhibiting bioactive phytochemicals [4]. There are lots of bioactive compounds in garlic, turmeric and cruciferous vegetables which having potential to suppress carcinogenesis [5]. For example :Diallyl disulfides – garlic, sulforaphane- cruciferous vegetables, curcumin – turmeric [6]. These bioactive compounds inhibit the cell growth in various types of cancers like breast cancer, colon cancer, prostate cancer, lung cancer, and skin cancer [7]. Many herbs and spices which also possess an array of pharmacological and biochemical activities which includes

antioxidant and anti-inflammatory properties that contribute to their ant carcinogenic activities. Hassanein HI, El-ahwany EG, Salah FM, Hammam OA, Refai L, et al found that extracts of Terminalia bellerica, Pelargonium zonale, Ulmus parvifolia Philodendron selloum, Ulmus pumila and are effective to induce cytotoxicity on human hepatoma and murine myeloma cell lines [8].

Appropriate diet plays a major role in cancer. ¼ percent of all cancers can be controlled by nutrition rich diet diets, physical activity, and maintenance of appropriate body weight [9].

MECHANISMS TO INHIBIT CARCINOGENESIS

1) Inhibition of carcinogen activation [10]

2) Xenobiotic metabolizing enzymes induction which protect from the toxic effects of environmental chemicals [11].

Molecular Targets which are inhibited by Chemo Therapeutic Agents in Cancer

a) Proteins which are involved in cell cycle progression and proliferation

b) anti-apoptotic proteins

c) Drug transport, MDR, MRP

d) Pathway of growth factor

e) NF-kB activation pathway f) Angiogenesis

g) Inflammatory proteins [12]

Side Effects of Chemotherapy

18 side effects are found from chemotherapy which include memory problems and fatigue [13]. Nausea and emesis are the most feared distressing side effect of chemotherapy [14]. Along with this Hair loss, Secondary neoplasm, Infertility, Teratogenicity, Organ damage, Cognitive impairment, Fatigue, Anemia, Gastrointestinal distress, Breast Cancer Patients Diagnosed with Chemotherapy-induced Peripheral Neuropathy [15]. It is also found that Men having high risk for Prostate Cancer [16]. In prostate cancer chemotherapy increases aggressiveness [17]

There is a need to reform the existing drugs, implementation of new strategies in chemotherapy [18]. Reactive Oxygen Species (ROS) management is the key for developing successful therapy in cancer cells [19]. CTCs in the blood may be useful for developing suitable biomarkers for detecting cancerous growth [20].

Role of MicroRNA in Cancer

miRNAs regulating initiation, progression and metastasis of tumor [21]. miRNAs are considered as the master gene expression regulators, miRNAs may account NSAIDs' mechanistic basis for complex pleiotropic antineoplastic activities [22].

CONCLUSION

In this i am exploring how the significance of dietary supplements in the prevention of cancer along with the use of natural products in the treatment of cancer. In this economic burden for treatment and management of cancer is more and control of this disease by dietary supplements and natural products is important to reduce this burden. Basic and clinical research studies have already demonstrated the efficacy of chemotherapeutic agents in protection against cancer.

ACKNOWLEDGMENT

This content of the article is scrutinized and approved by M. Murali and written by Neha Anand.

REFERENCES

1. Sharma R. Cancer Chemoprevention :Prevention is better than Cure. J Cancer Sci Ther. 2012;S3:e001.

2. Naga Anusha P, Siddiqui A, Hima Bindu A. Immuno Defense Mechanism against Tumors. *J Cancer Sci Ther.* 2011;S17.
3. Goyal PK. Cancer Chemoprevention by Natural Products :Current & Future Prospects. *J Integr Oncol.* 2012;1:e101.
4. Yedjou CG, Tchounwou PB. In vitro Assessment of Oxidative Stress and Apoptotic Mechanisms of Garlic Extract in the Treatment of Acute Promyelocytic Leukemia. *J Cancer Sci Ther.* 2012;S3:006.
5. Correll Abbey BS, Barqawi Al. Prostate Cancer Chemoprevention :A Current Review. *J Cancer Sci Ther.* 2011;S3:002.
6. Kumar N, et al. Prostate Cancer Chemoprevention Targeting High Risk Populations :Model for Trial Design and Outcome Measures. *J Cancer Sci Ther.* 2012;S3:007.
7. Hassanein HI, et al. Extracts of Five Medicinal Herbs Induced Cytotoxicity in Both Hepatoma and Myeloma Cell Lines. *J Cancer Sci Ther.* 2011;3:239-243.
8. Malik S, Khan S. Cancer Prevention Through Employ of Appropriate Diet in Daily Schedule. *J Cancer Sci Ther.* 2011;S16:001.
9. Zhang XR, et al. Influence of Pathologic Complete Response to Induction Chemotherapy on LongTerm Survival of Patients Advanced Squamous Cell Carcinoma of the Oral Cavity Tongue. *Chemotherapy.* 2014;3:133.
10. Zhang X, et al. Assessment of Dong Quai Hepatic Metabolism and Potential Interactions when Combined with Chemotherapy. *J Integr Oncol.* 2013;2:108.
11. Franken NAP, et al. Radiosensitization with Chemotherapeutic Agents and Hyperthermia :Effects on Linear-quadratic Parameters of Radiation Cell Survival Curves. *J Cancer Sci Ther.* 2011;S5 :002.
12. Malur R Usharani, et al. Comparison of Yoga vs. Relaxation on Chemotherapy Induced Nausea and Vomiting Outcomes :A Randomized Controlled Trial. *J Integr Oncol.* 2014;3 :116.
13. Wonders KY, Drury DG. Current Exercise Behaviors of Breast Cancer Patients Diagnosed with Chemotherapy-induced Peripheral Neuropathy *J Integr Oncol.* 2012;1:103.
14. Lu X, Wan G. Therapeutic Prospects of MicroRNA in Human Cancer. *J Integr Oncol.* 2012;1:e102.
15. Xi Y. MicroRNA: A New Player for Cancer Chemoprevention. *J Integr Oncol.* 2013;1:105.
16. Kim JJ, Verdone JE, Mooney SM. Chemotherapy Increases Aggressiveness of Prostate Cancer via Epithelial Mesenchymal Transition. *Cell Biol Res Ther.* 2013;2:2.
17. Feng Y, Wang N, Hong M. Cancer Chemotherapy :Time for New Solution. *Chemotherapy.* 2014;3 :130.
18. Maiti AK. Reactive Oxygen Species Reduction is a Key Underlying Mechanism of Drug Resistance in Cancer Chemotherapy. *Chemotherapy.* 2012;1:104.
19. Maiti AK. Emerging Biology of Circulating Tumor Cells (CTCs) in Cancer Detection and Chemotherapy. *Chemotherapy.* 2013;2:e121.
20. Chirila C, et al. Economic Analysis :Randomized, Placebo-Controlled Clinical Trial of Dutasteride in Men at High Risk for Prostate Cancer. *J Cancer Sci Ther.* 2011;S3:004.
21. Sai YRKM, Dattatreya A, Anand SY, Mahalakshmi D. Biomarkers and their Role in Premonition, Interpretation and Treatment of Cancer. *J Cancer Sci Ther.* 2011;S17.