

# Natural Compounds: Prospective of Chemoprevention

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Cancer is the leading cause of death for individuals less than 85 years of age in the United States [1]. Therefore, there is a great need to development more effective and less toxic therapeutics and preventive agents to prevent and treat cancer. Prevention may be the more effective and less costly approach because cancer is largely a preventable disease that can be attributed to lifestyle factors [2]. Chemoprevention is a promising anticancer approach aimed at delaying in onset of cancer, progression from precancerous lesion or recurrence after treatment by the administration of one or more naturally occurring and or synthetic agents. Now a day the concept of chemoprevention is gaining in huge attention because it is a cost effective alternative to cancer treatment. One can prevent or reduce the risk of cancer by avoidance of cancer-causing biological, chemical and physical agents and the habitual consumption of diets high in foods that protect against cancer or alternatively by increasing exposure to beneficial influence, including intake of chemo-preventive agents [2].

Now the question arise, why natural compounds for cancer prevention? Answer is very simple and straight forward. First of all, safety is always primary considerations in studies involving human subject who have no evidence of cancer who are potential candidates for chemoprevention. An ideal chemo-preventive agent is expected should be always nontoxic, effective at lower dose, orally taken, economical, and easily available. Most of the synthetic agents form pharmaceutical has toxicity and inherent resistance toward cancer therapeutic approach. Natural compounds have been presumed to be safer than synthetic compounds due to their presence in the diet, wide availability and tolerability. Epidemiological studies also continue to support the premise that diet rich in fruits, vegetables and some spices may decrease the occurrence of various human malignancies [3]. It also showed that individuals with lower serum levels of certain micronutrients (such as vitamin E, vitamin D, calcium, selenium, etc) had higher risk of cancer.

In recent year, natural dietary agent have drawn a great attention both from researchers and the general public because of their potential ability to suppress cancers as well as reduces the risk of cancer development. With the current price tag on cancer treatment, many people turn to natural compounds for chemoprevention, as well as for treatment of disease and improvement of side effect of therapy. It is noteworthy to mention that all clinicians are also paying great attention to diet derived chemo-preventive agents due to the willingness of patients to use over the counter diet-derived agents.

The ancient medical reports suggested that surgery was performed in cancer patient but physician also recommended the some natural, especially plant products, which signify an interesting point of comparison with current knowledge. Today, natural product or product derived from natural source such as plants, animals and micro-organisms play an important role in cancer therapy as an anticancer agents used in the clinic. It is important to mention that vitamin and micronutrients became the agents of choice for early cancer chemoprevention trails. Selenium and vitamin E are used for prostate cancer trails in more than 35000 men with average risk and based on the trails use of alone or combination could reduce the incidence of prostate cancer.

During the last five years, researchers have taken increasing

attention to establish a new technology on the natural-product-based drug discovery approach such as combinatorial synthesis and high throughput screening. The classical examples of plant derived natural products are vincristine, vinblastine, irinotecan, etoposide, and paclitaxel. Actinomycin D, mitomycin C, bleomycin, doxorubicin and L-asparaginase are drugs coming from microbial sources, andcitarabine is the first drug originating from a marine source. Todate, researchers also developed new generations of taxanes, anthracyclines, Vinca alkaloids, camptothecins, as well as the novel class of epothilones. Some of these are in clinical use, others in clinical trials.Trabectedin—ET-743, bryostatin-1, neovastatare the agents originated from marine sources (both plants and animals) have alsoentered clinical trials. All these drugs act through different mechanisms of action for example interaction with microtubules, inhibition of topoisomerases I or II, alkylation of DNA, and interference with tumor signal transduction.

Recent sciences developed some of the promising natural agents for cancer prevention. They are tea polyphenols (from tea) [4], curcumin (from turmeric) [5], capsaicin (from chili) [6,7], iso-thiocyanate (from cruciferous vegetable) [8], resveratrol (from red wine) [9], lycopene (from tomatoes, watermelon, and pink grapefruit) [10], pomegranate (pomegranate fruit) [11], luteolin (from green vegetable such as, broccoli, cabbage spinach etc) [12], genistein (from soybeans) [13].

Apart from the aforementioned dietary agents, other natural compounds which are actively investigated for their chemo-preventive potential and showed promising results against various cancer areellagicacid, some triterpenes (such as lupeol, betulinic acid, ginsenosides, oleanolic acid), Polyunsaturated Fatty Acids (PUFAs), and ginkgolide B.Ellagic acid is an antioxidant polyphenol originated from fruits and vegetables including grapes, strawberries, raspberries, pomegranates, and nuts, exhibited chemopreventive activity against skin, lung, esophageal, colon, bladder, prostate, and breast cancers [14,15]. Lupeol and betulinic acid are the triterpenes have been exhibited chemopreventive activities against multiple cancer types [16,17]. Study also showed that the n-3 PUFAs (linoleic acid and its derivatives) has exhibited promising chemopreventive activity in animal models of prostate, breast and colon carcinogenesis [18]. Ginko biloba extracts and its constituent ginkgolide Bhave also been studied for their chemopreventive activities and showed some promise against several cancer types [19,20].

Nature is still today a rich source of active principle against cancer cells. The identification and development of natural compounds and

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their derivatives have greatly contributed to this progress and many of these compounds are now being used in clinical practices resulted increased therapeutics efficacy. Therefore, the key challenge for researcher is how best to use this information for effective cancer prevention in population of different cancer risks. It might be possible if researcher may combine two or more natural agent and could get synergism effect or introduce synthetic analogs of natural compound to get more potency. The future research direction of prevention therapy drug development will open new window for natural compounds in reducing the public health impact of major cancers.

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