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An Overview of Cancer Vaccines

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Editorial

Cancer is a terrifying illness that ranks among the most pressing health concerns facing humanity and necessitates a proactive approach to treatment. Plants are a rich source of new chemical compounds and offer a promising avenue for cancer research. Chemotherapy has so far had some unpleasant side effects despite being successful. But compared to standard treatment methods, using plants and products produced from them is a simple, safer, eco-friendly, affordable, quick, and less harmful option. The actions of phytochemicals are focused on tumour cells alone, with no negative effects on normal cells. The intricate process of carcinogenesis involves numerous signalling cascades [1].

Phytochemicals are regarded as promising possibilities for the development of anticancer drugs due to their pleiotropic effects on target events in many ways. The development of possible candidates from these phytochemicals, which can stop or reduce the proliferation of cancer cells without causing any negative effects, is currently being researched. Numerous phytochemicals and the analogues they were generated from have been identified as possible anticancer treatment options. Through this thorough study, an effort has been made to highlight the most recent advancements and significant victories in phytomolecule-based cancer therapeutics that target nuclear and cellular components. Drugs used to treat cancer and its limitations have also been covered. Despite advances in illness detection, treatment, and preventative strategies, cancer is a severe case of metabolic syndrome and one of the main causes of death. The prevalence of cancer is constantly rising, making it one of the leading causes of mortality and morbidity worldwide. A normal cell can become cancerous when its unchecked growth results in genetic instability and mutations that build up inside cells and tissues [2].

Tumor suppressor genes (p53, NF1, NF2, RB, and biological breaks), oncogenes (MYC, RAF, Bcl-2, RAS (biological accelerators), and genes involved in cell growth metabolism are among the genes affected by these genetic instabilities. Cancer can be brought on by both environmental (radiation, smoking, nicotine, contaminants in food, water, air, chemicals, certain metals, and infectious agents) and internal (genetic mutations, immune system defects, and hormonal imbalances) factors. Humans can develop a variety of cancers; among them, lung cancer is said to be the most common in men, followed by breast cancer in women. In depth details on various cancer types are provided. It is a significant public health burden that is regularly addressed by medicinal plants as a whole or by its phytochemicals in both developing and developed countries. There have been numerous attempts to reduce the negative side effects of medications used in cancer therapy, including measures to protect adjacent cells and tissues, increase drug accumulation and effectiveness in the lesion, and create novel drug delivery and targeting systems. There are numerous further cancer treatment options available, including surgery to remove the tumour, radiotherapy, immunotherapy, chemotherapy, cancer vaccines, photodynamic therapy, stem cell transformation, or combinations of these options that are frequently associated with serious adverse effects. These adverse consequences include restricted metastasis, toxicity, nonspecificity, and limited bioavailabilityThe type, stage, and location of the cancer determine the treatment options. Cytostatic and cytotoxic medicines used in chemotherapy have demonstrated promise either on their own or in combination with other cancer treatments [3,4].

Topoisomerase inhibitors such as irinotecan, which can cause neutropenia, sensory neuropathy, and diarrhoea, and doxorubicin, which can cause cardiotoxicity, alkylating agents such as oxaliplatin, melphalan, carboplatin, and cyclophosphamide, which can cause nephrotoxicity, gastrointestinal toxicity, cardiovascular toxicity, pulmonary toxicity, and hematologic toxicity, and microtub. The medications indicated above are quite effective in treating a variety of malignancies, but they also have certain drawbacks (side effects, expensive, very complex, not eco-friendly and toxic). Under typical physiological settings, certain body cells, such as those found in the digestive tract, bone marrow, and hair follicles, grow quickly. These modern anticancer medications also aim at these quickly proliferating healthy cells, which is difficult and leads to negative side effects. Reduced blood production, GIT inflammation, hair loss, immunosuppression, heart illnesses, and neurological disorders can all be caused by these negative effects. Another drawback is that these cancer cells develop medication resistance as a result of mutations. When docetaxel was applied, the drug resistance genes ABCA4 and ABCA12 were overexpressed in human MCF-7 breast cancer cells, respectively. However, downregulation of drug resistance genes was seen when the phytochemical curcumin was used in conjunction with docetaxel. Therefore, using a chemical agent with a single target to cure cancer cells is an ineffective strategy. As a result, according to results of considerable research, phytochemicals and the derivatives of these substances offer the best and least hazardous cancer treatment options [5].

Humans are given medicinal plants by nature to aid in their quest for improved health. Since ancient times, people have used plants and their bioactive substances as medicines. Numerous types of medicinal plants include phytochemicals that stop the growth and spread of cancer. According to studies, the plant kingdom contains about 250 000 different plant species, of which only about 10% have been investigated for their potential to treat various ailments. Plant elements such as the flower, flower stigmas, pericarp, sprouts, fruits, seeds, roots, rhizomes, stem, leaf, embryo, and bark all contain phytochemicals and their derived counterparts, which have a variety of therapeutic uses. Numerous plant substances, including alkaloids, flavonoids, lignans, saponins, terpenes, taxanes, vitamins, minerals, glycosides, gums, oils, biomolecules, and other primary and secondary metabolites, play important roles in either blocking the proteins, enzymes, and signalling pathways that activate cancer cells [5].

Conflict of Interest

None.

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