Advances in Cancer Therapeutics

Cancer is the leading cause of death globally, and millions of people are affected by this disease. The worrisome increase in cancer patients worldwide has led to the necessity for the generation of more effective therapies for the various types of cancers. The treatment relies upon traditional chemotherapeutics agents and surgical and radiological interventions. Traditional chemotherapy poses some challenging issues of damaging the healthy cells, leading to severe side effects, suboptimal concentrations of the therapeutic agents at the tumor site against the cancerous cells, and drug resistance [1]. To overcome the bottleneck constraints of conventional anti-cancer therapeutics, many advances in the field of cancer therapeutics have taken place. Over the decades, researchers have put in many efforts for the development of effective site-specific therapies for the treatment of cancer. Cancer therapeutics have seen a paradigm change; traditionally, the treatment was limited to chemotherapy, and now, with advances in cancer therapeutics, newer products have been developed that utilize nanotechnology and surface modification, target drugs, antibody-drug conjugates, viral vectors, etc. [2-6]. Advances in cancer therapeutics have increased the scope of treatment and survival of cancer patients with reduced side effects to the normal human cells.

The use of nanotechnology in cancer therapeutics has proven to be effective not only for the treatment but also for the diagnosis of cancer patients. Studies have shown that there is a preferential uptake of nanoparticulate systems by tumor site (EPR effect), and surface modification techniques not only lead to the minimization of activation of defense system but also aid in active targeting of drugs to be site-specific [7, 8]. The scope of the research on nanotechnology-based cancer therapy using various nanomaterials has led to enhanced and effective treatment of the various types of cancers. Nanomaterials encapsulate chemotherapeutic agents and have a relatively large surface area that can be functionalized with various ligands enabling the wide range of the drugs with acceptable pharmacokinetics. Lipid-based drug delivery systems have proven to be promising for the treatment of breast cancer. Another strategy to overcome the limitation of drug resistance and high incidences of adverse effects faced by traditional chemotherapy is to use synergistic combinations of phytoconstituents with chemotherapeutic agents. With the decline in new drug discovery, repurposing of drugs for their anti-cancer potential effects on various types of cancers is also an emerging field.

Targeted therapies for cancer target the drug to a specific gene or protein involved in the cancer progression. Inhibitors of matrix metalloproteinases are being explored for cancer treatment because of the increasing evidence of their overexpression at various sites [9].

Impaired activity of histone deacetylases (HDACs), epigenetic regulators of gene expression, has been reported for the development of several human cancers. This has led to the recognition of HDAC inhibitors as an attractive therapeutic strategy against some cancers. Structural insights into human HDACs enable rational drug discovery for HDACs involved in distinct breast cancer types [10]. There have been recent developments in the field of IgM Mannitou as an early diagnostic marker and potential therapeutic agent specifically for glioblastoma multiforme. Also, advanced nano-carrier-based approaches for the effective treatment of glioblastoma are showing potential in overcoming the current line of treatment [11].

Therapies based on gut are also emerging as preventive and curative approaches to treat cancer since gut dysbiosis has been reported to be involved in the progression of cancers [12].

The thematic issue on “Advances in cancer therapeutics” will benefit the readers in applying the newer advances for cancer therapeutics for the development of novel therapeutics leading to effective and enhanced drug delivery to the target organ, overcoming the physical and biological barriers.

REFERENCES

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