Editorial
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Application of Nanomaterials in Oncology

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Editorial

Cancer is the next to cardiovascular disease as a cause of death in several parts of the world. Cancer is a man-made disease by modern industrialisation. It should be noted that nothing in the natural environment can cause cancer. Pollution, adulteration of foods, change in food and life styles massively increase the world-wide incidence of cancer. Conventional treatment options for cancer include a combination of chemotherapy, surgery and radiation therapy. The major drawback of the chemotherapy is the nonspecific systemic distribution, which results in inadequate drug delivery to the tumour site, systemic cytotoxicity and subsequent drug resistance. Nanotechnology provides a better solution to cancer treatment.

Nanotechnology is an advanced research subject over the past few decades globally. Nanomaterials exhibit unique physico-chemical, biological, optical, magnetic and electrical properties because of their small size. A rapid explosion of knowledge in the field of Nanomedicine has been witnessed over the past few years that offered novel tools for the diagnosis and treatment of cancer. Over a dozen nanomedicines including Abraxane, DaunoXome, DepoCyt, Doxil, Genexol-PM, Marqubio, Myocet, Nanotherm, Oncaspar, Onivyde and Zinostatin stimalamer has been approved by Food and Drug Administration for clinical use. More than 30 drugs are undergoing clinical trials [1,2]. Nanomaterials afford mode for targeted drug delivery to tumour site as well as sustained drug release. This enhances the bioavailability, stability and solubility of the drug as well as their delivery to the tumour sites through the enhanced permeability and retention effect. It also greatly reduces the side-effects associated with the conventional chemotherapy. Nano-drug delivery systems include nanoparticles, liposomes, polymer drug conjugates, micelles, colloidal dispersions, etc. Magnetic nanoparticles show excellence toward developing effective targeted drug delivery systems. It is possible to concentrate drug loaded magnetic nanoparticles at a chosen tumour site from blood circulation with the help of an external magnetic field gradient [3]. The success of drug delivery with magnetic nanoparticles mainly depends on the magnetic properties after surface modification and drug loading, drug release profiles. Surface modification with albumin, dextran, and starch cause difficulty in loading high doses of drugs [4]. Several metal- and carbon-based nanomaterials can be used for photothermal and photodynamic therapies which utilize light to destroy cancer cells [5,6]. Diagnostic assays to accurately identify cancer-specific biomarkers at early stages of cancer will be developed with the advance in nanomedicine. Multifunctional nanoparticles are being developed for simultaneous *in vivo* imaging and treatment of cancer [7]. Nanooncology has the potential to provide safer and more effective treatment of cancer. Nanomaterials can bring a revolutionary change in the field of medicine especially oncology, but a good understanding of their interaction at the molecular and cellular level and possible side effects have to be considered for better future.

At this juncture, many educational and research institutions in developing countries suffers the lack of sufficient sophisticated equipment that is required for advanced research. Moreover some countries drastically reduced their funds for research in nanotechnology. This lead to the focus on basic research in nanotechnology and many investigators are forced out of the nanotechnology field. Researchers are encouraged for advanced research through sufficient funds and international collaborations.

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