Nanomedicines in cancer therapy: Advances and challenges

Special Issue for Current Drug Metabolism

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**Aims & Scope:**
Cancer is one of the leading causes of death in the world and remains a difficult disease to treat. Main hurdle in cancer therapy come from tumor heterogeneity, chemotherapy toxicities and the most problematic one is chemotherapeutics resistance. On the other hand, the conventional cancer chemotherapies suffer the limitations that include poor solubility of drugs in aqueous medium; delivery of sub-therapeutic doses to target cells; limited bioavailability; and most importantly, non-targeted delivery leading to non-specific toxicity to normal tissues. Over the past five decade, extensively interdisciplinary investigation in nanotechnology based drug carriers design for cancer chemotherapy and cancer biomedical research developed a new avenue that often called as cancer nanotechnology or cancer nano or bio-nanomedicines. Including many advantages, this strategy particularly help in satisfactory chemotherapy against drug resistant (DR) or multi-drug resistant (MDR) cancers. DR or MDR may come from the over expression or under expression of some enzymes responsible for catabolism and activation of prodrugs respectively, efflux by ABC transporters, avoiding immune destruction and tumor microenvironment etc. These smartly designed nano-therapeutics harness the opportunities provided by nanomaterials to target the delivery of drugs more specifically, improve solubility, extend half-life, improve therapeutic index, and reduce immunogenicity. Progress in nanomedicines research have made possible to overcome or inhibit the factors responsible for DR or MDR. Nanomedicines due to their small tunable size and surface, bigger surface area/volume ratio and surface property providing the opportunity of multiple payloads, multivalent-ligand targeting with higher loading and better in-vivo stability. Lipophilic and hydrophilic macro or micromolecules as anticancer and diagnostic agents can easily be incorporated and used for cancer chemotherapy and diagnostic purpose. Interestingly, diagnostics and anticancer drug can simultaneously be delivered via nanomedicines (called as theranostics). Till date, enormous numbers of nanomedicines from the category of organic (such as liposome, SLN, Nanoemulsions, and polymeric nanoparticles etc) and inorganic nanomaterial (such gold, iron oxide, silica nanoparticles, carbon nanotubes, quantum dots etc) have been invested and many of them were placed in clinical oncology as nano-diagonistics, nanomedicine and theranostics. On the other hand, regardless of their presence in clinical practice, different stages of clinical trials and immense prospective outcome in cancer nanobiomedicine R & D, toxicity concern with such nanomaterials is a big concern that cannot be overlooked. This thematic issue is symposium with the focus on nano-pharmaceutical designs for target specific effective chemotherapy. Moreover, this special issue also cover the current views on the factors responsible for DR and MDR of cancer and rationalized design of nanomedicines targeting these factors in chemotherapy.

**Keywords:**
Cancer nanotechnology, Nanomedicines, drug delivery, vaccines, pharmaceuticals, multidrug resistance, ADME.

**Subtopics (not limited to):**
- Factors effecting the ADME and the therapeutic outcome of nanomedicine
- Studies of nanoparticles synthesis and its ADME in cancer nanotechnology
- Implementing the chemistry of material and nanoparticle synthesis in cancer theranostics.
- New challenges in the use of nanomedicine in cancer therapy
- Modification of ADME for effective cancer chemotherapy
- Combination of physical therapies with nanotechnology
- Role chemistry in developing nanomedicines to overcome cancer resistance.
- Chemistry and ADME of nanoparticles in gene delivery

**Schedule:**
Manuscript submission deadline: March 2017, Peer Review Due: May 2017, Revision Due: June 2017