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Editorial

Therapeutic Applications of Nanobiomaterial - A Review

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Early detection of disease is a primary goal of the medical community to develop better therapeutics. In this scenario, nanotechnology holds great promise for enabling the production of effective therapeutics. In particular, nanoparticles have showed tremendous potential for detecting cancerous cells, virus and disease markers. Gold, zinc and cobalt coated nanoparticles offers promising alternatives for biomedical applications.

Gold coated ferromagnetic nanoparticles tagged with HIV antibodies can detect viral particles left after completion of conventional drug therapy. Metallic nanoparticles in the form of polymers have also been functionalized with different biomolecules to detect specific proteins, antibodies, and other disease indicators. Biomolecule coated ultra small superparamagnetic iron oxide (USPIO) particles injected in the blood stream recognize target molecular markers present inside cells and induce a specific signal for detection by magnetic resonance imaging (MRI). This technology allows detection of individual cancer cells much earlier than traditional diagnostic tools. Nanomaterial based drug delivery systems allow for targeted delivery of compounds characterized by low oral bioavailability due to poor water solubility, permeability and/or instability and provide for longer sustained and controlled release profiles. These methods of drug delivery systems can increase the potency of traditional small molecular drugs in addition to potentially providing a mechanism for treating previously incurable diseases.

Nanotechnology has made significant contribution in the field of stem cell research. For instance, magnetic nanoparticles (MNPs) have been successfully employed to isolate and group stem cells. Quantum dots have been used for molecular imaging and tracing of stem cells. For delivery of gene or drugs into stem cells, nano materials such as carbon nano tubes, fluorescent CNTs and fluorescent MNPs have been used. Unique nanostructures were designed for controlled regulation of proliferation and differentiation of stem cells. All these advances speed up the development of stem cells toward the application in regenerative medicine. The recent applications of nanotechnology in stem cell research opened up new avenues in regenerative medicine. Nanotechnology can be a valuable tool to track and image stem cells, to drive their differentiation into specific cell lineage and ultimately to understand their biology. This will hopefully lead to stem cell-based therapeutics for the prevention, diagnosis and treatment of human diseases [1-5].

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