Nanoparticles-A Picture Who Worth's a Thousand Words in Biotechnology

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Abstract:

The field of nanotechnology holds the central position in biomedical field and used for the construction of materials ranges in "nanometer". These nano-sized objects differ remarkably from other identical traditional objects due to their novel physio-chemical properties. Synthesis of nanoparticles (NPs) with controlled protocols has been one of the major goals in biotechnology. NPs have revolutionized the biomedical field and acts as a splendid carrier in Drug-Delivery System (DDS). Controlled drug delivery system has many advantages over traditional forms, as it maintains a specific and controlled rate of drugs to perform an action on the site of infection. Cell-specific targeting is all due to especially composed carriers, which works specifically on target positions. Discoveries in the past decade have clearly shown that the electromagnetic, optical and catalytical properties of these NPs are greatly influenced by size, shape and distribution, which are varied by varying the reducing agents, stabilizers and the synthesis methods. An extensive review of literature has been conducted to emphasize all the synthesis aspects of NPs, computational behavior of binding of nano-carriers to biomolecules and their applications in various fields. Finally, current limitations, trials and future perspectives of NPs are also critically discussed

Keywords:
Nanoparticles; Nano-carriers; Targeted delivery; Biogenic; DDS; Biomolecules

Introduction

He word "Nano" is derived from Greek language, which includes particles in the size range of 1 to 100 nm. In the past decade, there has been a remarkable increase in the field of fabrication of nano-particles with controlled morphologies and unique features making it an extensive area of research [1]. Nano-particles have novel physiochemical characteristics as compared to other solid bulk objects i.e. they have large reactive area and exceptional electronic properties. He small size, even surface, good solubility, and poly-functionality of nano-particles will persist to open many caves and do wonders in biomedical fields [2]. Di$erent synthetic approaches have been used for the preparation of nanoparticles with novel morphologies. However, the main focus is to design NPs using environmentally benign approaches. Hese provide solutions to future challenges related to environmental issues [3]. $ier synthesis, characterization is done by various biochemical techniques to adjust their size, shape, and reliability.

Biomedical applications:

Nanoparticles (NPs) are used to overcome limitations in chemotherapy and other conventional treatments. Nanoparticles in drug delivery are made of di$erent sizes (1-1000 nm) and di$erent materials depending upon the use e.g. magnets for hyperthermia (magnetic nanoparticles), liposomes (solid-lipid nanoparticles). Hey can also carry imaging probes with the drugs designed to target specific molecules in diseased tissues. In cancer therapy and diagnosis numerous advantages of nanoparticles have been observed which include prolonging circulation time, minimized non-specific uptake, enhanced solubility of hydrophobic drugs, preventing o$-target and harmful e$ects, improved intracellular specific targeting in cancer therapy. Nanoparticles are delivered by passive and active targeting to enhance intracellular concentration of drugs and avoiding e$ect on normal cells. Hey can also be further modified to lower toxicity

Other application of nano-particles:

Due to more developments nanoparticles are applicable in many others fields such as oil, biomedical, agriculture and food production, agro waste and use of magnetic nanoparticles in cancer therapy and diagnosis. Some of them are discussed below.

Biomedical applications:

Nanoparticles involve novel strategies which are used for the diagnosis of diseases, gene therapy of cancer, drug delivery and prevention of other infections also. Cancer is the abnormal division oftheir absorption, accumulation, translocation and beneficial e$ects on growth and development of crop plants. He beneficial e$ects includes enhanced germination percentage and rate, vegetative biomass of seedlings and increased length of root and shoot in many crop plants including radish, lettuce, spinach, onion, pumpkin, soybean, rape, tomato. Nano-foods are the foods in which nano-technological approaches are used during production, processing or packaging of the food. Foods made by nanotechnology are rapidly coming into the market which includes cooking oil called Canola Active Oil. He canola oil contains a space cavity called nano drops, which are made to carry minerals, vitamins and phytochemicals through the digestive system and urea. Some nanomaterial

which are made of two or more layers known as nano-alminates are suitable and being used in food industry and are also used in edible coatings of food like vegetables, chocolate, fries, meats, and bakery products and these coatings can also act as barrier to gases, lipids which is one of a great advantage of nanotechnology

Future Prospects:

He combination of nanotechnology with medicine has manufactured a product which in turn has enhanced the fight against a number of diseases. In reality, nanomedicine is a product of latest research that has led to cure devastating diseases. Targeted drug delivery is now emerging fast due to its potential to transport drugs at specific sites [52]. He main purpose in further evolution of nanomaterials is to render them versatile in function and governable by signals coming from external or by local environment and hence crucially turning them into nanodevices. Hey all outline the bright future of targeted drug delivery

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