A Review on Nanotechnology in Cancer Treatment

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Abstract- *Cancer is a disease in which some of the body's cells grow uncontrollably and spread to other parts of the body. Cancer treatment is one of the major challenges of modern medicine. Cancer targeting treatment has been greatly improved by new tools an approaches based on nanotechnology. Nanotechnology can be applied to target drugs to the surface or to the interior of specific cells. it can also be used in diagnosis and prognosis of diseases. In addition , Nano shells and nanoparticles are the most promising applications for various cancer treatments.*

Keywords- cancer, nanotechnology, nanoparticles , cancer treatment

I. INTRODUCTION

Cancer is a disease in which some of the body's cells grow uncontrollably and spread to other parts of the body. Cancer is a group of diseases involving abnormal cell growth with the potential to invade or spread to other parts of the body. There are many types of cancer treatment. The types of treatment that you receive will depend on the type of cancer. Cancer therapy currently limited to surgery, radiation and chemotherapyall three methods risk damage to normal cells tissue selectively to cancerous cells and neoplasms and enhance the therapeutic efficacy of radiation based and other current treatment modalities.

Nanotechnology is science, engineering, and technology conducted at the nanoscale, which is about 1 to 100 manometers. Nano refers to the 10-9 power, or one billionth. For comparison, a human hair is about 100,000 nanometres thick. There are many interesting Nano devices being developed that have a potential to improve cancer detection, diagnosis, and treatment of cancer nanoparticles is defined as a partical of matter is between 1-100 nm

Nanoparticles can be defined as particles less than 100 nm in diameter that exhibit new or enhanced size - dependent properties compared with larger particles of the same material

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Metal nanoparticles (silver and gold) are widely used in

1) cell imaging
2) DNA hybridization
3) proteins interaction and
4) photo thermal therapy

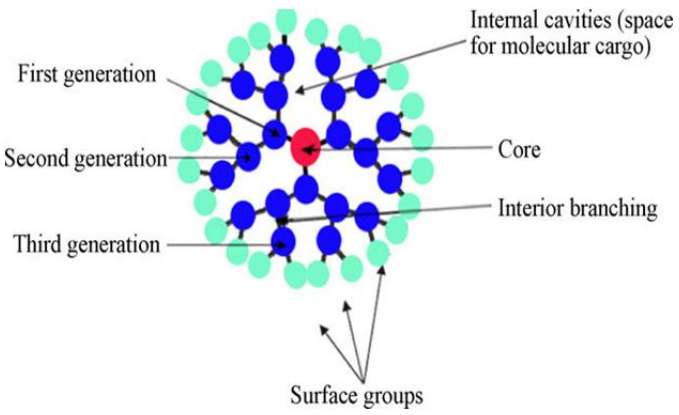
Advantages of nanoparticles :

1) Improved bioavailability by enhancing aqueous solubility
2) increasing resistance time in the body (increasing half life for clearance)
3) Stable dosage form of drugs
4) Faster dissolution
5) Decrease toxicity
6) Smaller dosage form

Nanotechnology in drug delivery system and cancer treatment

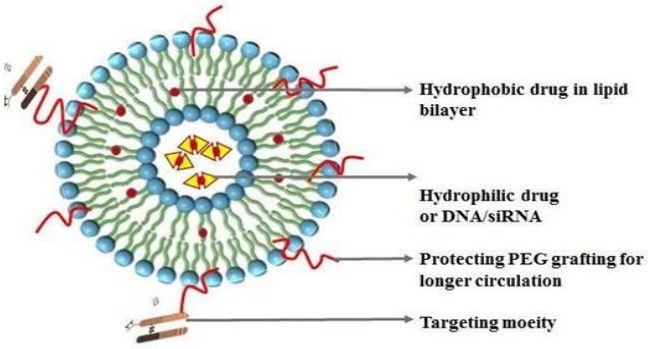
1. Dentrimers :

Dentrimersare highly branched, star-shaped macromolecules with manometer-scale dimensions. Dentrimers are defined by three components: a central core and an exterior surface with functional surface group The varied combination of these components yields products of different shapes and sizes with shielded interior cores .dentrimers have been explored for the encapsulation of hydrophobic compounds and for the delivery of anticancer drugs. There are three methods for using dendrimers in drug delivery. First, the drug is covalently attached to the periphery of the dendrimer to form dendrimer prodrugs. Second the drug is coordinated to the outer functional groups via ionic interactions .Third the dendrimer acts as a unimolecular micelle by encapsulating a pharmaceutical through the formation of a dendrimer-drug supramolecular assembly.



2.Liposomes :

A liposome is a spherical vesicle having at least one lipid bilayer. The liposome can be used as a vehicle for administration of nutrients and pharmaceutical drugs. Liposomes can be prepared by disrupting biological membranes (such as by sonication). Liposomes are most often composed of phospholipids, especially phosphatidylcholine, but may also include other lipids, such as egg phosphatidylethanolamine, so long as they are compatible with lipid bilayer structure. A liposome design may employ surface ligands for attaching to unhealthy tissue.



3) Nanoshells:

Nanoshells are miniscule beads coated with gold. By manipulating the thickness of the layers making up the nanoshells . scientists can design these beads to absorb specific wavelengths of light. The most useful nanoshells are those that absorb near- infrared light, which can easily penetrate several centimeters of human tissue. The absorption of light by the nanoshells creates an intense heat that is lethal to cells. These gold nanoshells are shuttled into tumors by the use of phagocytosis. Phagocytes engulf the nanoshells through the cell membrane to form an internal phagosome, or macrophage. Nanoparticle-based therapeutics have been successfully delivered, taken up passively into tumors without the assistance of antibodies

4) NANOROBOT:

A Korean research team has successfully developed bacteriobots that can diagnose and treat cancer. This bacteria-based robot is expected to be utilized to develop new treatments for cancer and various microrobots or nanorobots for medical purposes in the future. Bacteriobots are made up of bacteria and 3μm-sized microstructures filled with anticancer drugs. Genetically-modified non-toxic bacteria move inside tissues or blood with flagella, and find tumors by pushing microstructures and targeting certain drugs secreted by cancer cells. Upon the arrival of bacteriobots in the tumor region, anticancer drugs that come from microstructures are spread onto the surface of tumor.

II. CONCLUSION

Types of cancer cells have unique properties that can be exploited by nanoparticles to target the cancer cells. nanoparticles can be used to detect and to treat cancer .

we will make early detection, prevention and treatment with a high degree of accuracy and ease possiblethat is effective and can be made it safe.

No human trials have been performed yet and human trials are still at least a few years away. (Unknown side effects, toxicity,)

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