

Future Effect Of Nano-Medicine On Human Generation

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ABSTRACT

Nanomedicine is the process of diagnosing, treating, and preventing disease and traumatic injury, of relieving pain, and of preserving and improving human health, using molecular tools and molecular knowledge of the human body. In the mid-term, biotechnology will make possible even more remarkable advances in molecular medicine including microbiological engineered organisms. In the longer term, perhaps 10–20 years the earliest molecular machine systems and nanorobots may join the medical armamentarium, finally giving physicians the most potent tools imaginable to conquer human disease, ill-health, and aging. Nanomedicine is defined as the monitoring, repair, construction and control of human biological systems at the molecular level, using engineered nanodevices and nanostructures. Nanomedicine ranges from the medical applications of nanomaterials to nanoelectronic biosensors and even possible future applications of molecular nanotechnology. The aim of nanomedicine is the improvement of healthcare for the benefit of the patient. Nanomedicine is an important and rapidly growing field, which is emerging from the application of nanotechnology to healthcare. Nanomedicine can offer impressive resolutions for various life threatening diseases in child (nano drug addicted next generation).

Keywords – DNA, Nanomedicine, nanoparticles, nanotubes, nanobiosensor, nanorobotics, nanomaterials

I. INTRODUCTION

Nanotechnology is emerging as one of the key technologies of the 21st century and is expected to enable developments across a wide range of sectors that can benefit citizens and improve industrial competitiveness. There is as yet no common definition of nanotechnology. The nanometer scale is usually set at 1 to 100 nm and nanotechnology makes use of the new properties of materials at this scale that differ from those at a larger scale. Recent advances in the capabilities to manipulate atoms and molecules have pushed the development of nanotechnology.

Nanotechnology is a generic term used for a broad range of different activities and applications ranging from energy production and storage, manufacturing, information technologies to medicine. For that reason often the plural form “nanotechnologies” is used.

Nanobiotechnology, the convergence of nanotechnology and biotechnology (Nanobiotechnology is defined as a field that applies the nanoscale principles and techniques to understand and transform living or non living biosystems and which uses biological principles and materials to create new devices and systems integrated from the nanoscale and in particular its applications in the medical sector are considered as one of the most promising and most advanced areas of nanotechnology. Applications include e.g. nanoparticles for molecular diagnosis, imaging and therapy as well as complex nanostructure surfaces to control tissue repair on a cellular level. It is expected that nanobiotechnology applications in medicine will bring significant advances in the diagnosis and treatment of disease. This has led to a steadily increasing research activity in this area over the past decade.

The present document focuses on nanobiotechnology applications in medicine, which in the last two years are referred to as “nanomedicine”, a term that will also be used in this document. There are many ways of defining nanomedicine. Nanomedicine is the application of nanotechnology to health. It exploits the improved and often novel physical, chemical, and biological properties of materials at the nanometric scale. In contrast to the often used limitation to size dimensions of 1-100 nm, in nanomedicine size dimensions of 1-1000 nm are included. This is due to the fact that in medicine nanotechnology aims to improve and optimize material properties for their interaction with cells and tissue, to allow e.g. passive tumour targeting, crossing of the blood-brain barrier, or to improve the bioavailability. This approach makes use of nanoscale materials larger than 100 nm. Polymer therapeutics are situated at the borderline between nanotechnology and macromolecular chemistry, they are, however, often classified as nanomedicine. On the other hand biochips are often considered per se as nanotechnology, regardless if they include

nanoscale components. In this document biochips are only included if they contain nanoscale components. The above given definition of nanomedicine, is therefore amended by the following statements:

1. Nanoparticles for medical applications are defined, as common in pharmaceutical sciences, as particles with a size between 1 and 1000 nm.
2. Biochips are only classified as nanotechnology, if they include nanoscale components.
3. Polymer therapeutics are classified as nanomedicine.

The study covers several nanomedicine application areas: drug delivery, drugs and therapies, in vivo imaging, in vitro diagnostics, biomaterials, and active implants. Tissue engineering and regenerative medicine are included as far as biomaterials are concerned. [3]

II. WORKING OF NANO-MEDICINE

Nanodiamonds drug delivery system shows a new path to the medical science. This technology reveals many roads toward the effective and safe treatment of Cancer. Nanodiamonds have many other advantages that can be utilized in drug delivery. They can be functionalized with nearly any type of therapeutic. They can be suspended easily in water, which is important for biomedical applications. The nanodiamonds, each being four to six nanometers in diameter, are minimally invasive to cells, biocompatible and do not cause inflammation, a serious complication. New technology may make cancer drugs more effective and ease the burden of chemotherapy.

A nanotube is a nanometer-scale tube-like structure. It may be of following types:

1. Carbon nanotube
2. Inorganic nanotube
3. DNA nanotube
4. Membrane nanotube

One of the important properties of nanotubes is that they can easily penetrate membranes such as cell walls. In fact, long and narrow shape makes them look like miniature needles, so it makes sense that they can function like a needle at the cellular level. Using this property by attaching molecules that are attracted to Cancer cells to nanotubes to deliver drugs directly to diseased cells. Nanotubes bound to an antibody that is produced by chickens have been shown to be useful in lab tests to destroy breast cancer tumors. The antibody carrying nanotubes are attracted to proteins produced by a one type of breast cancer cell. Then the nanotubes absorb light from an infrared laser, incinerating the nanotubes and the tumor they are attached to. Improve the healing process for broken bones by providing a carbon nanotube scaffold for new bone material to grow on. [8]

Combination of cancer medicine with tiny particles of carbon called nanodiamonds. These

diamonds are nothing like the gems used in jewelry. They're just a few nanometers across. A nanometer is one billionth of a meter. This new technology is the use of Nanodiamonds having a coat of the drug and proteins that targets the Cancer cell in body and destroy the cancerous cells without affecting any normal cell. Nanodiamonds are the diamond crystals less than 100 thousands million of meter in size. Delivery of drug using this system reduces the side effects and improves the targets. [2] The nanodiamond surfaces are that they like to attract water, for example, as well as other molecules, like drugs. This property to bind anti-cancer drugs to nanodiamonds, the value of nanoparticles made of diamond is multifaceted. Made of carbon, they're nontoxic, and the body's immune system doesn't attack them. They can bind tightly to a variety of molecules and deliver them right into a tumor. And because they are only 2 to 8 nanometers in diameter, they are easy for the kidneys to clear from the body before they block up blood vessels, a long-standing problem in nanoparticle therapy. [5] These nanomaterials can shuttle chemotherapy drugs to cells without producing the negative effects of today's delivery agents. Clusters of the nanodiamonds surround the drugs to ensure that they remain separated from healthy cells until they reach the cancer cells, where they are released. More beneficial part is that these nanodiamonds have been shown not to induce inflammation in cells once they have done their job Figure-3

Nanodiamonds for nanomedicine:- Carbon nanomaterials for biological applications revealed that carbon nanodiamonds are much more biocompatible than most other carbon nanomaterials, including carbon blacks, fullerenes and carbon nanotubes. The noncytotoxic nature of nanodiamonds, together with their unique strong and stable photoluminescence, tiny size, large specific surface area and ease with which they can be functionalized with biomolecules, makes nanodiamonds attractive for various biomedical applications both in vitro and in vivo. The synthesis and surface functionalization of diamond nanoparticles for nanomedicine as well as an overview of the recent progress in this exciting field by focusing on the potential use of nanodiamonds and their derivatives for single particle imaging in cells, drug delivery, protein separation and biosensing. Figure-4

III. IMPACT ON HUMAN BODY

It is known that the exposure to ultrafine dust particles poses health risks for humans. This implies that exposure to engineered nanoparticles could pose health risks too. Particularly because of their mobility across biological barriers, size related chemical activity effects and their ability to penetrate cells, nanoparticles show properties that could result in increased toxicity compared to bulk

materials. [9] Nanoparticle sources are natural (e.g. salt spray from the ocean), unintentionally produced (e.g. cooking, material fabrication, diesel exhaust) or, relatively new, engineered nanoparticles. Generally two forms of application of nanoparticles need to be distinguished with respect to exposure and possible health risks:

1. Nanoparticles bound into a chemical matrix, such as a polymer or a metal. Unless nanoparticles are released due to chemical processes or wear, these materials are generally considered as safe.
2. Free nanoparticles in the air or in fluids that can be taken up by the body via the lung, skin or the intestinal tract.

Nanoparticle emission, intentionally or unintentionally, can occur during research and development activities, manufacturing, use, and after use/during disposal, and after their dispersion in the environment. Potentially exposed groups comprise staff in R&D, manufacturing, diagnosis and treatment, disposal, recycling, remediation and cleaning, transport and trade, and accidents, patients, and the general population. [7] Additionally, ecosystems might be affected. Therefore toxicologists warn that health and environmental effects of nanoparticles and exposure of workers need to be investigated. There is consensus among stakeholders that the present level of knowledge is insufficient for risk assessments. The need to

1. Develop harmonized nomenclature and criteria for nanoparticle characterisation, Develop methodologies for routine measurements,
2. Develop equipment and methods for the determination of the environmental fate of nanoparticles and for the detection in the environment, and for exposure assessment to nanoparticles,
3. Understand toxicity and eco toxicity of nanoparticles,
4. Conduct epidemiological studies

It has been shown that nanomaterials can enter the human body through several ports. Accidental or involuntary contact during production or use is most likely to occur via the lungs, from which a rapid translocation is possible to other vital organs through the bloodstream. On the cellular level, an ability to act as a gene vector has been demonstrated for nanoparticles. Carbon black nanoparticles have been implicated in interfering with cell signaling. There is work that demonstrates uses of DNA for the size separation of carbon nanotubes. The DNA strand just wraps around it if the tube diameter is right. Though excellent for the purposes of separation, this tendency raises some concerns over the consequences of carbon nanotubes entering the human body

IV. ADVANTAGE AND DISADVANTAGE OF NANOMEDICINE

With the help of nanomedicine diseases can be easily cured with no side effects and no surgery is required. Its detection is also very easy. The disadvantage appeared with nanomedicine is its implementation difficulties and high cost.

V. CONCLUSION

Nanotubes are superimposed on DNA strand which change the whole capability of DNA strand. By this the generation after generation DNA will travel in a same manner giving future advancement and more capability in efficiency of Human being see figure 5 Nanomedicine, one of the important applications of the nanotechnology has made a revolutionary development in the medical field. The evolution is what will lead us to our new future and as in our past with medicine and how we were able to make certain disease obsolete like Typhoid Mary, T.B., smallpox, chicken pox and mononucleosis. This evolution will possibly be the end of cancer by nanodiamonds and aids which will greatly increase our chances for survival as well as our children. Nanotechnology will radically change the way we diagnose, treat and prevent cancer. Nanomedicine for cancer has the ability to improve health care dramatically. [8]

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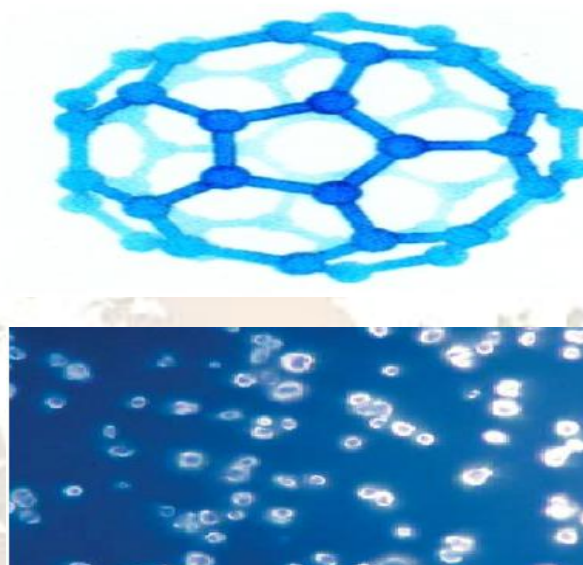


Fig.1: Nanodiamond

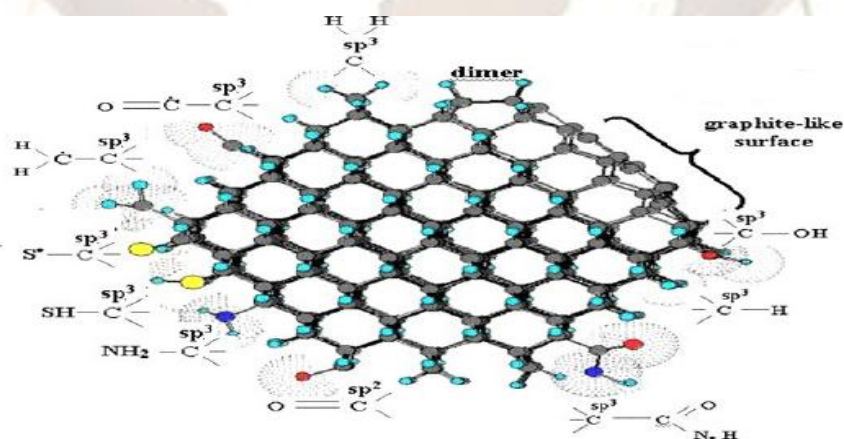


Fig.2: Nanodiamond structure

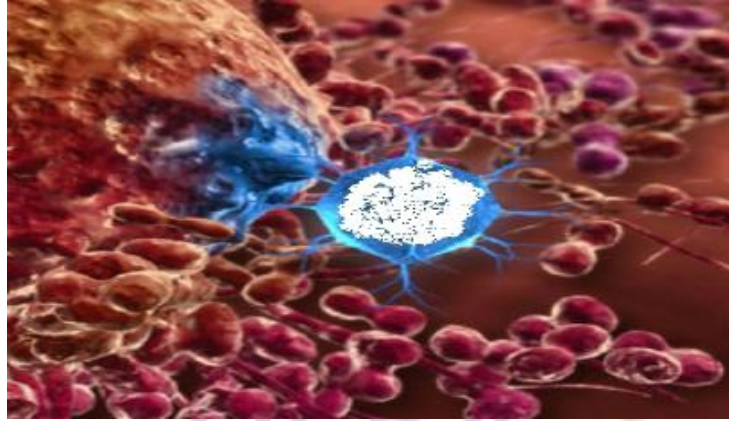


Fig.3: Nanodiamond in cancer treatment

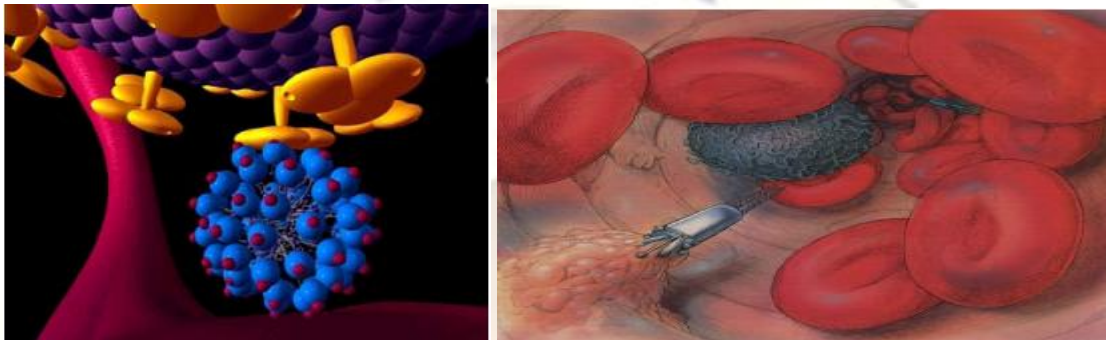


Fig.4: Nanomedicine

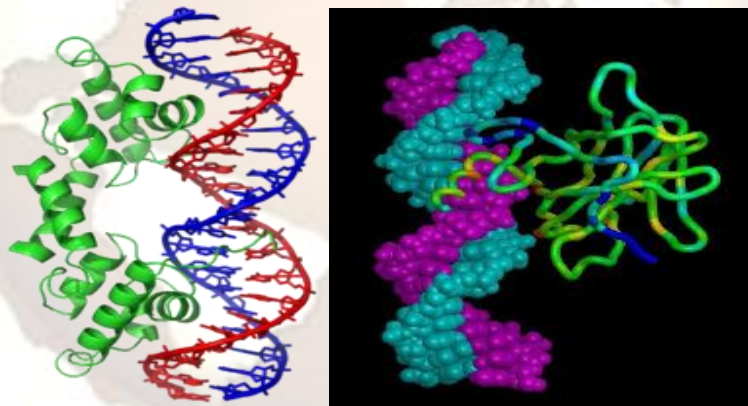


Fig.5: Gene therapy with nanodiamond