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Biological and clinical perspectives of nanobiotechnology

Review article

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Abstract

Nanotechnology is the use of tools at the nano-level (less than 1 micrometer). Nanotechnology is an emerging technique of biotechnology for future generations. Applications of nanotechnology as nanomedicine is used for therapeutic and diagnosis purpose in medical science with imaging techniques in in-vivo and in-vitro. Nanotechnology has applications to treat neurodegenerative disorders such a Parkinson's disease and Alzheimer's disease. It also deals with CNS disorders by drug delivery and gene delivery mechanisms. Nanotechnology tools used for applications are metallic, organic, or inorganic depending on the condition and their nature. Besides these, nanorobotics is an advanced and major application of nanotechnology in diagnosis and treating disorders by interacting, sensing, and manipulating the body. This field has a major scope for future generations to deal with. Nanotechnology does have limitations besides its advantages as there are certain hurdles to cope with. Nanotechnology is a future saver for newcomers and will continue to be efficient to improve human health and the environment.

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1. Introduction

The term "nanotechnology" was first coined by Drs. Norio Aniguchi in 1974 as a process and use of materials made of a single atom or molecule [1]. Nanotechnology works with materials at a maximum nanometer scale (1-100 nm), and can thus be used for a wide range of applications and for the manufacture of a wide variety of nano materials and nano materials [2]. However, it is also natural that these substances should reflect various structures such as chem conduction. Electrical regeneration, magnetism, light effects and physical energy, from a large number of materials due to their small size. Nanomedicine is defined as the use of different tools based on nanotechnology to develop faster and more effective solutions to medical or disease management problems. It can not only overcome the challenges faced by conventional medicine, but also strengthen the understanding of various physiological and pathological processes. A deeper understanding of such processes provides new opportunities and therapeutic ideas for existing problems [3]. The development of nanomedicine-based methods, coupled with the growing understanding of cancer biology, has promoted the logical development of targeted therapies using chronic and external therapies to improve drug delivery. These advances also support the production of theranostic nanomedicines that combine the drug with the imaging agent to further evaluate the efficacy of the treatment within the patient's body [4]. The origin of the nanomedicine concept is related to the idea that nanorobots and related machines can be designed, made, and introduced into the human body to make cellular adjustments at the cellular level. Nowadays, nanomedicine has many different types of benefits, realising the idea that the ability to build materials and devices on a molecular scale can bring great immediate benefits to research and drug development [5].

2. Nanomedicine for diagnostic purposes

Typically, nanodiagnostic is used to describe the use of nanotechnology for molecular diagnostic purposes. Nanodiagnostics refers to the structural design of devices using at least one nanoscale dimension to detect events that occur automatically in nanoscale. Nanodiagnostics alters the need for clinical diagnosis for early diagnosis and high sensitivity [4]. Where applicable, nanodevices can be used in conjunction with existing imaging technologies more directly in vivo and in vitro diagnostics. Nanodiagnostics will enable the discovery of biological molecules below the acquisition limits of common techniques and will provide details about individual members in complex biological systems and life spans [6]. Nanodiagnostic platforms with foundations are currently designed for the detection of genetic biomarkers, single nucleotide polymorphism (SNPs) and pathogen nucleic acid [7].

2.1. Applications in testing

Major and initial applications of nanomedicine are advanced fluorescent diagnostic indicators for diagnostic and therapeutic purposes. Typical fluorescent markers require complex lasers, which can be applied only once before the fluorescence fades, and are not discriminatory due to dye bleeding. Fluorescent nanoparticles, such as quantum dots, PEBBLES (probes embedded in local embedding) and fluorocarbon articles, can overcome this problem [8]. In addition, nanotechnologies will provide the limitations of current cell diagnostics and assist in the evaluation of care, combination of diagnostic and therapeutic drugs, and customization of your own. In addition to the limited use of diagnostic tests, the most important current uses are expected in the areas of biomarker discovery, early cancer diagnosis, and the discovery of infectious viruses [9].

3. Liquidicine for therapeutic purposes:

Nano-biotechnology to study nanoparticles on a nano scale. There are different areas and applications of nanotechnology in different countries. Three main applications include therapeutic sites that act as nanomedicine to treat disease, and have 6-magnets and electricity and are able to distinguish between normal and disease cells [1].

Applications in therapeutics:

In the Treatment of Neurodegenerative Disorder:

The first most common is Parkinson's disease and the second one is Alzheim er's disease. Everyday about 10 % of worldwide population infect from NOD and it will lead to 20% in the next ten years. Dementia is the common form of Alzheimer and 60% (30 million) population suffered due to increased population and long life span. Drug delivery method is used in treatment of NOD by blood brain barrier but it is not capable of removing the disorder rather minimizing the symptoms of the disease [I I].

In Central Nervous System

Along with cancer, there are other disorders being occurring and nanotechnology has aimed to overcome these by the drug delivery of nanoparticles. Thymoqllinone nanoparticles are capable of providing protection against diabetes, CNS disorders and inflammation. Single walled carbon nanoparticles like graphene has biomedicine applications. MiRNAs and siRNAs act as regulatory factors due to the spread of diseased cells from skin, kidney, breast and lungs [1 2-14]

In Drug Delivery

Drug delivery can be done through three conditions like inhalation, direct injection or oral inhalation. Before exposure of direct injection to body organs there will be an interaction of nanoparticles with protein molecules. Gold NPs are used for drug delivery and photo thermal therapy (introduced after antibiotics) is a substitute method for treatment and involved the entry of dye free of toxic nature with slightly used wavelengths to detected part of body in order to remove cancer, muscular degeneration [15].

In Cancer

Cancer is a common and prevalent disease worldwide. Metastasis imitating cells cause spread of diseased cells and circulating tumor cells in blood slhow poor disease conditions. Enhanced permeability and retention factor (EPR) are beneficial methods to remove circulating tumor cells (CTCs) with the usage of NPs to prevent the distribution of cancer-causing agents [16].

In Gene Therapy:

Nanotechnology is associated with structure, function and synthesis of nanomaterials to target gene delivery. Food and drug administration approved the drug and gene delivery method for treatment. Lipid NPs enters the liver from the body and stops the body from releasing disease causing proteins. The main aim being to move nanomaterials to the location of the disease. This method has been effective for certain cardiovascular disorders like HIV/AIDS [1].

Tools Used for Nanomedicines

Nanomedicine comprises of the application of nanobiotechnology to medicine. It includes diagnosis of a disease, rape drawings, prevention and an unfounded understanding of the basics of the human body [20]. [9]. There is a wide variety of nano being investigated now for use in various applications e.g. polymer, liposomes, dendrimers, gold and silver nano part of the ice and carbon nano tubes.

METTALIC NANO TOOLS:

Metals are designed to create oxides, which have a variety of geometric geometry and provide metallic, semiconductor, or insulating structures. Their nanoscale treatment and production of iron oxide nanoparticles (MONPs) have enabled the study for their resistance to biological systems (e.g., lls). Care should be taken to avoid their toxic effects on healthy cells, tissues and organs. Although there is a positive effect of MONPs, they are widely provided with a variety of programs such as health care and cosmetic products [21]. Titanium is widely used in the formation of bone marrow and transp teeth. It is compatible with Biochemical and is a promising metallic also l. Popular among the various types of titanium oxides is TiO_2 and ROS and ZnO are used. In addition, Gold, Silver and Copper Nano are also commonly used in the production of bio-sensing, bio-imaging and cancer.

Polyethylene glycol (PEG) molecules bind to these particles in order to protect themselves from the immune system and to avoid indirect binding. Y ys are used for most drug use according to conjugating and various functional groups and for the stabilization of Nano-product with a range size (1- 150 nm) [22].

NANO BIO VESSELS:

New Nano-bio vessels are similar to various body recipients, ligands, DNA, and proteins. This analogy of the ass their contact with the membranes and cells under different biological. The most preferred animals for biometer are Nano-based carriers inhibits the accumulation of nanoparticles in cells with permanent toxicity. They are biodegradable and can covered by macrophages [23]. Polysaccrides (natural polymers) e.g., Inssulin and chitosan are also as used as biological nano tools.

Limits of Nanomedicines

There are many obstacles being faced during the Nano -treatment of lung cancer. Nano treatments sound good on theoretical methods but effective exposures offer some limitations. Proper site administration, low inconsistencies, improper location, and the appropriate size of the drug charge are factors associated with nanoparticles. And when nanoparticles are used in clinical trials, certain limitations apply there [17]. Many advanced therapies have the potential to pursue. However, testing this challenge many of the harmful health effects associated with nanomaterial exposure have not yet been reported in man, but there is an indication of their accumulation in animals that exposure is dangerous. Due to their small size, nanoparticles always have a strong alkand and toxicological inefficiency compared to their larger units of chemical similarity [27]. Problems related to the size of Nanotools lead to duplication of many biological substances and increase their ability to penetrate membranes and tissues. Because of their low size, it is unlikely that the disclosure of items would exceed the standards of medical practice. Definition of appropriate parameters for conducting clinical observations of other means of exposure, such as particles the number concern tration, may be a matic problem, providing a limited knowledge reaction. The key is measurement level to calculate the lasting effects on the human body [28].

Concerns about social and safety of nanomedicines

Nanoparticles are generally safe to use, there are lethal effects in pharmaceutical companies such as pulmonary exposure to carbon nanotubes (CNTs) which can be the cause of patient rebirth [29]. The accumulation of magnetic iron oxide nanoparticles within the body or in injections is due to the unprotected binding of strong therapeutic particles because it can release the drug from healthy tissues instead of targeted tissues. Non-targeted targeting will not only lead to healthy tissue mobilization but also to the delivery of therapeutic doses to the target area. Their ability to transmit many biological barriers within the body such as the blood brain barrier (BBB) causes adverse effects of any defect, or environment (depletion of the ozone layer in the atmosphere) [27].

Future Perspectives of nanomedicine:

Many nanoparticles and nanodevices are processed for specification, and this has a profound effect on human health. The vision is to improve the situation by strengthening the performance and safety of nanosystems and nanodevices. In addition, early diagnosis, preparation of facilities, treatment of cancer and aggressive treatment of diseases, diabetes and other diseases is expected [7]. In the years to come, the nano technology will play a key role in a future source that will provide diagnostic approaches, diagnostic procedures and methods for improving health and improving human health.

Conclusion

The use of nanomaterials brought many benefits to mankind. Nanotechnology -based nanomedicine means that tools and devices are technologically engineered in a way that can interact at the cellular level and improve the drug treatment index without side effects. It sets out a comprehensive program of drug administration, protein detection, robots, cancer and cardiovascular treatment, etc. Detailed description is obvious, but the fact that objects with nanometer size are under power control is very different from macro -objects. These unique behaviours are what make nanomedicine possible, and by increasing our understanding of these processes, new ways to improve the quality of human health will be improved. However, this will take time. In the next few years, more and more use of nanotechnology will become a common place within medicine.

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