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Biomedical Research Based on New Nanomaterials

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Abstract: Under the background of the new era, people's research on nanomaterials continues to deepen, and new nanomaterials continue to develop, which plays an important role and value in many fields. Especially in the field of medicine, nano-new materials have shown great value and potential in the field of biomedicine due to their unique chemical and physical properties, which promote the occurrence of many changes. This article will start with the types of new nano materials, and gradually go into their applications in the field of medical biology. Finally, it will briefly analyze the current problems of new nano materials applied in the field of biomedicine and put forward relevant solutions. It will further show the important scientific significance and wide application prospects of new nano materials, in order to contribute to the development of medicine in the future. This paper will provide a meaningful reference for other researchers.

Keywords: New nano materials; Biomedicine; Nanotechnology

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1. Introduction

Due to its unique size, nano-materials have shown irreplaceable roles in the field of biomedicine and are innovative in the application of diagnosis and therapy. Among them, the antibacterial property of metal nanomaterials has been applied to anti-infection treatment, the optical properties of gold nanoparticles have a very important role in biological imaging, and the semiconductor nanomaterials can give full play to their luminous properties and be used in biomarkers. It can be said that new nanomaterials have important application significance.

2. The types of new nano materials

New nano materials are important research objects in recent years. There are various kinds of nano-new materials, and their preparation methods are also different. Metal nanometer materials with excellent electrical and optical properties, can be used in a chemical reduction method, the preparation of microemulsion synthesis methods. Semiconductor nanomaterials have unique quantum size effects and photoelectric properties. Nano new material

also are constantly development studies, gradually formed a more efficient preparation technology, its application scope also expanded [1].

3. Application of nanomaterials in biomedicine

3.1. Drug delivery

Nanotechnology has a unique role in the field of drug delivery. Compared with traditional drugs, which are affected by the degradation of enzymes in the body, nano-carriers can prevent this situation, enhancing the stability of drugs by strengthening the drug protection mechanism. Nanocrystals play a positive role in dealing with drugs with poor solubility and effectively improve the solubility. Nanocarriers are also used in drug positioning, which can be accurately delivered to the lesion for precise treatment [2]. Taking tumor treatment as an example, nanocarriers can use the characteristics of tumor cells to deliver drugs accurately, which can not only give full play to the efficacy of drugs but also effectively reduce their damage to normal cells. Drug-loaded nanosystems can also be applied to drug release to regulate the rate of drug release, and adapt to the treatment needs of different diseases through continuous release, slow release, or targeted release.

3.2. Biomedical imaging technology

Contrast agents and the functional nanoparticles in the biomedical imaging technology have a positive effect, effectively improving image quality and efficiency. The limitations of traditional contrast agents are relatively obvious, such as insufficient contrast and potential toxic hazards. Nano-contrast agents based on new nano-materials can make up for the defects of traditional contrast agents, enhance the contrast, make the image clearer, and shorten the imaging time, thereby improving the imaging efficiency. It is worth mentioning that nano-contrast agents have also made great achievements in reducing potential toxicity, reducing side effects to a great extent, and reducing human injury. The functional nanomaterials, particularly prominent in the treatment of tumors, can be more efficient in identifying the cell surface sign, achieving early detection and treatment of tumors [3].

3.3. Biomolecular detection

Nanosensors have promoted the revolutionary progress of biomolecular detection technology, and their unique properties have greatly improved the ability to identify very low concentrations of biomolecules, which can effectively realize the early detection and early treatment of diseases, and have very important value in diagnosis and treatment. Nanotechnology based on DNA chip detection sensitivity was significantly improved, its sensitivity to the 50 times of the traditional method, realizing high sensitivity, and further for the discovery and treatment of the disease. The rapid and efficient use of nanomaterials makes it possible to screen a large number of samples [4]. Nanobiosensors and chip technology based on nanomaterials has become a technical guarantee for personalized medicine and precision treatment. In the future, it is expected to achieve a breakthrough and change in the form of traditional disease diagnosis and treatment, and inject fresh blood into the development of medical industry.

3.4. Diagnosis and treatment of cells

Nanotechnology also shows great potential in cell diagnosis and therapy. Taking tumor therapy as an example, the localization accuracy of tumor cells labeled with nanomaterials is improved by 30%, which assists in targeting quality. The photothermal therapy of metal nanoparticles also improved the treatment effect. The delivery of

drugs based on nanomaterials is more accurate, which can be directly delivered to tumor cells, greatly reducing the harm to normal cells. Nanotechnology can also be applied in cell localization and labeling, which provides the possibility for the development of cell therapy and tissue engineering [5].

4. Dilemmas and solutions in the application of new nano-materials in biomedicine

4.1. Biological safety of materials

Nanotechnology materials in the human body may bring potential toxicity and risks, especially their biological safety has attracted wide attention. Although the application of nanotechnology in the medical field is promising, its safety is still one of the main obstacles restricting its development [6]. At present, the toxic mechanism of nanomaterials is not fully understood, but it has been found that some nanomaterials can penetrate the cell membrane and cause damage to the structure and function of cells. At present, the main methods to evaluate the biosafety of nanomaterials include in vitro cell experiments and animal experiments, which can evaluate the cytotoxicity, genotoxicity, and mutagenicity of materials [7]. At the same time, specific assessment techniques based on cytotoxicity and high-throughput screening of biomarkers have also been developed. Although these techniques provide effective means for the safety assessment of nanomaterials, they still need to be further improved and standardized. The construction of a reliable evaluation system is of great significance to guide the design and application of nanomaterials.

4.2. Challenges of fabrication technology

Nanomaterials have strong applications in many aspects, including the biomedical field, energy, environmental protection, electronics, and other fields, which also means that the demand for new nanomaterials is growing. However, its preparation technology still faces many challenges, large-scale preparation technology faces many difficulties, such as product quality problems, environmental protection problems, etc. However, the preparation technology still faces many challenges, such as product quality problems and environmental problems. From the perspective of the laboratory, it is difficult to achieve large-scale production of nano-new materials. The reason is that the physical and chemical properties at the nanoscale are extremely sensitive to the synthesis conditions, which is easy to produce quality problems, that is, quality imbalance. In the actual operation process, problems such as size, morphology, and surface properties may occur [8]. From the perspective of industrial production, the factory needs to consider the cost problem, and how to ensure cost control while the material is synthesized becomes a big problem. In addition, large-scale production also involves environmental issues. In the production process, we must first ensure environmentally friendly, avoid harmful substances to the environment, and achieve sustainable development [9]. Based on this, large-scale production puts forward higher requirements for technology and new standards for equipment. All parties should actively participate in technology research and development, integrate cross-field forces, jointly overcome the difficulties in large-scale preparation of nanomaterials, achieve seamless docking from laboratory to factory, smooth transition, and strengthen the control of the environment and cost while ensuring the quality and efficiency of material production.

4.3. The problem of achievement transformation

There are many problems in the transformation process of nanotechnology achievements, such as product and process verification, cost, etc. It can be said that product marketing and clinical application face many obstacles.

For example, in the process of product and process verification, the first priority is to ensure the safety and effectiveness of products. At the same time, it is necessary to strengthen the control of product quality standards, such as formulating corresponding laws and regulations to formulate unified standards for the quality of nano products, so as to provide a guarantee for its clinical application. Other countries also attach great importance to the effective application of new nanomaterials by formulating corresponding laws and regulations, providing clear policy guidance, and other means to realize their safe application in the biomedical field [10].

4.4. Practical application of new nano material-gold nanoparticles

Gold nanoparticles (AUNPs) are a kind of new nanomaterial with good optical, electrical, and thermal properties, which have a strong application value in the field of biomedicine, and the demand is relatively high. The research and application of gold nanoparticles first faces the production problem, especially to ensure the uniform particle size and high yield. Large-scale production of gold nanoparticles faces many problems [11]. At present, gold nanoparticles are mainly produced by the medical wet chemical method. In this process, problems such as wide particle size distribution, poor uniformity, and low production efficiency have gradually become prominent. Since then, people have tried the microemulsion method, starting from the fine control of chemical reactions, which not only fills the defects of the wet chemical method but also greatly improves the yield. This also lays the foundation for the clinical research and application of gold nanoparticles.

Gold nanoparticles (AUNPs) have shown remarkable results in cancer therapy. Firstly, the optical properties of gold nanoparticles can be used in CT imaging to greatly improve the clarity and accuracy of tumor localization, which is conducive to the early detection and timely treatment of tumors. Secondly, gold nanoparticles can effectively kill cancer cells with a killing rate of up to 85% by absorbing light in the near-infrared region, which is also known as photothermal therapy (PTT). Finally, gold nanoparticles (aunPs) can be designed as drug carriers to achieve efficient drug encapsulation by exploiting their unique physical and chemical properties [12]. The excellent drug-loading ability of gold nanoparticles (aunPs) can significantly enhance the drug release in vivo, which greatly improves the efficiency of drug therapy. Studies have shown that with the assistance of gold nanoparticles, the release of drugs in the body can be increased by 40%, the therapeutic effect is significantly enhanced, and the toxic side effects are effectively reduced. By using gold nanoparticles, the side effects of drugs can be reduced by 50%, which makes the treatment process safer and more reliable compared to traditional treatment methods. This not only provides a new strategy for accurate diagnosis and efficient treatment of tumors, but also lays a solid foundation for the promotion of gold nanoparticles in clinical application [13].

5. Conclusion

New nano-materials are becoming an important part of biomedical research, showing great value and broad prospects. In the past, the preparation technology of new nano-materials technology has been continuously improved, and its application scope has been continuously expanded. Breakthroughs have been made in the diagnosis and treatment of diseases. In the aspects of drug delivery, medical imaging, biological detection, and cell diagnosis and treatment, nano-materials have shown a high degree of functionality and high efficiency, which is a powerful boost for the development and progress in the biomedical field [14]. However, at the same time, there are still some problems in the aspects of biological safety, preparation technology and achievement transformation, which need us to study deeply, overcome difficulties, improve the safety and efficiency of the application of new

nano materials, and improve the achievement transformation rate of new nano materials, so that it can play a maximum value in the field of medical biology, and provide technical support for disease discovery and treatment. At the same time, this also provides new challenges and opportunities for biomedical students. It is essential to fully recognize the mission and responsibilities inherent in the field, emphasizing the consolidation of foundational knowledge, the cultivation of professional skills, and the development of a scientific and rigorous research mindset. Active engagement in the research and application of emerging nanomaterials, combined with a spirit of deep exploration and innovation, will contribute meaningfully to the advancement of biomedical science. Such efforts are vital to promoting the health and well-being of human society [15].

Disclosure statement

The author declares no conflict of interest.

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