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Application of fluorescent gold nanoparticles in medicine

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Abstract

One of the nanomaterials used in medicine is fluorescent gold nanoparticles that can react with body proteins and form bonds. This ability of fluorescent gold nanoparticles can be used many times, but in this short article we will try to get a brief knowledge about these materials. (This article has only one source)

Keywords:. Gold in medicine , Nanomaterials in medicine

۱. *Introduction*

Metal nanoparticles are spherical nanomaterials with a diameter of 2 nm. In this size range, nanoparticles have a discrete electronic structure and molecular properties due to quantum confined effects, leading to HOMOLUMO transfer, intrinsic magnetism, and strong luminescence.

Gold nanoparticles (AuNCs), a type of noble nanomaterial, are made up of several hundred gold atoms. Compared to gold and nanoparticles in general, this particular form of nanoparticles has physiological properties. One of the interesting features of AuNC is its highly catalytic activity, which has gained a good reputation in the fields of catalysis such as fuel cells, CO2 reduction, energy conversion, water separation, decomposition of pollutants, organic transformation reaction and so on.

۲. Antimicrobial activity of AuNCs

The excellent antibacterial ability praises AuNCs as potential antibacterial options for fighting superbug infections and overcoming the drug resistance of conventional organic antibiotics. As a type of fluorescent optical material, AuNCs do not contain toxic heavy metals compared to some quantum dots such as CdSe, CdTe, PbS and so on. In addition, due to its excellent resistance to oxidation, gold is much more stable than fluorescent silver nanoparticles due to its resistance to AuNCs, and fluorescent AuNCs have exceptional properties unique to organic fluorophores. However, there are still changes and challenges for such modifications of AuNCs, for example, stability in AuNCs to prevent their accumulation.

Studies have shown the use of various stabilizing agents such as mercapto compounds, dendrimers, nucleic acids and proteins to produce AuNC. However, some ligands require complex or environmentally harmful synthetic processes (such as phenyl ethanethiol), and some AuNCs have shown low brittle stability at pH and poorly soluble in water. These bugs prevented the widespread use of AuNC.

Proteins, as biological macromolecules, have three-dimensional organization and free spaces and can be used as templates for the preparation of fluorescent AuNCs. AuNC protein contains several distinct properties that make it largely attractive and attractive because it is inherently environmentally friendly, the synthesis process is mild in reaction conditions, and AuNC proteins are soluble in water and They have excellent stability. Resistance to loss of shelf life and changes in pH,

temperature, salt, etc. have been repeatedly demonstrated in many works. This is an undoubted competence of protein AuNCs.

However, the relationship between fluorescence and protein structure has not yet been clearly elucidated, and the underlying mechanism for fluorescence production is still unclear. The lack of such guidelines means that we cannot obtain a suitable model for AuNC using synthetic proteins or polypeptides of sequences and determinant structures. In addition to further research into the mechanisms, the discovery of more protein patterns could provide useful information for understanding protein-AuNCs.

Natural proteins such as soy protein, egg protein (CEW) and papain are readily available, and are commercially viable, diverse and numerous in animals, plants and foods, providing a model platform for exploring different types of AuNC. is. Natural Protein AuNCs have intrinsic clot biocompatibility due to the employment of natural proteins, which is the most important and archetypal competence compared to AuNCs in synthetic polymers and bare exogenous compounds.

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It has been shown that synthesized bovine serum albumin (BSA) produced by AuNCs can inhibit the production of inflammatory mediators induced by lipopolysaccharides and type II collagen vitamins due to rheumatoid arthritis in mice in vitro and in vivo.

۳. Conclusion

Neu glycoprotein AuNCs containing assay probes have been used for plant lectins and dendritic cell imaging. Tolerance and modified gelatin stabilized AuNCs from tolerance without detectable cytotoxicity to human keratinocyte cell line, and further imaging performed on human skin. On the other hand, negative impacts on the environment have been a major concern about the rapid development of nanomaterials. Long-term nano-environmental interactions will lead to negative consequences for the entire environmental system. Especially those nanomaterials that work

with modification, integration with industrial chemicals, put more pressure on the environment. Therefore, nanomaterials without very low environmental toxicity are required. Taking advantage of the low toxicity of gold and animal and plant proteins to nature, natural protein AuNCs can be considered as environmentally friendly nanomaterials.

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