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Short Commentary

Comments on "Cancer Diagnosis and Treatment Platform Based on Manganese-based Nanomaterials."

Xiaobing Duan[1]* and Xiaobing Liang[2]

[1]Guangdong Provincial Key Laboratory of Tumor Interventional Diagnosis and Treatment, Zhuhai Institute of Translational Medicine, Zhuhai Clinical Medical College of Jinan University, Zhuhai, Guangdong, China

[2]Guangdong Huixin Life Science Co., Ltd., Zhuhai, Guangdong, China

***Corresponding authors:** Xiaobing Duan, Zhuhai Clinical Medical College of Jinan University, Zhuhai, Guangdong, China

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Cancer is a serious disease that poses a significant threat to human health. Early diagnosis and treatment are crucial for improving patient survival rates. In recent years, the application of nanotechnology in the field of cancer, particularly the precision diagnosis and treatment platform based on manganese-based nanomaterials, has garnered considerable attention. This novel nanomaterial possesses unique physical and chemical properties that enable precise diagnosis and treatment at the level of cancer cells, offering new hope for cancer patients. Manganese-based nanomaterials hold immense potential and significant advantages in precision cancer diagnosis and treatment. Due to their nanoscale characteristics, these materials can penetrate tissues more effectively, achieving higher sensitivity and more accurate diagnosis. However, manganese-based nanomaterials also have some limitations. Firstly, the accuracy of manganese-based nanomaterials in cancer diagnosis still needs improvement. While these materials can identify cancer cells through targeted actions, their ability to recognize different types of cancer cells remains limited. This may result in misdiagnosis or underdiagnosis, affecting treatment outcomes. Therefore, further research and enhancement of the targeted recognition mechanism of manganese-based nanomaterials are needed to improve their accuracy in cancer diagnosis.

The application of manganese-based nanomaterials in cancer treatment also presents notable advantages. By modifying the surface properties of manganese-based nanomaterials and functionalizing them, targeted recognition and eradication of cancer cells can be achieved while minimizing damage to normal cells. Additionally, these nanomaterials can serve as carriers for loading chemotherapy drugs or photothermal agents, enabling targeted release and localized treatment to enhance treatment effectiveness and reduce side effects. This precise treatment strategy can effectively inhibit tumour growth and metastasis, prolonging patient survival and increasing treatment success rates. However, the drug release efficiency of manganese-based nanomaterials in cancer treatment needs improvement. Although these materials can efficiently transport anticancer drugs to tumour sites, their drug release rate and efficiency are still not ideal. This may lead to premature or inadequate drug release in the body, impacting treatment outcomes. Therefore, new material designs and drug release mechanisms need to be explored to enhance the drug release efficiency of manganese-based nanomaterials in cancer treatment.Furthermore, manganese-based nanomaterials exhibit good biocompatibility and biodegradability, posing no long-term toxic side effects on the human body, providing a reliable guarantee for clinical applications. While these materials demonstrate good biocompatibility *in vitro* studies, their toxicity and metabolic mechanisms *in vivo* remain unclear. This may limit the widespread application of these materials in clinical practice. Thus, more *in vivo* studies are required to understand the toxicity and biocompatibility of manganese-based nanomaterials to ensure their safety and efficacy. The stability and controllability of manganese-based nanomaterials in practical clinical applications still need further improvement. Additionally, the high production cost of manganese-based nanomaterials restricts their potential for large-scale applications. Therefore, despite the significant importance of manganese-based nanomaterials in cancer treatment, their limitations need to be carefully addressed to promote their broader application and development.

In conclusion, the precision diagnosis and treatment platform for cancer based on manganese-based nanomaterials holds tremendous potential and prospects for development, yet it also presents some limitations. With the continuous advancement and refinement of nanotechnology, it is believed that manganese-based nanomaterials will become an essential tool for cancer diagnosis and treatment in the future, offering patients a better quality of life and health. It is hoped that in the near future, this novel nanomaterial can be widely applied in clinical practice, bringing new hope and possibilities for overcoming cancer.

Citation:

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