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Nanotechnology-based intelligent drug design for cancer Metastasis treatment

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Abstract:

Nanotechnology is becoming an important tool in modern healthcare, especially for improving drug delivery methods. Most chemotherapy treatments currently used for cancer were developed decades ago during the early period of the cancer research movement. While these drugs are effective at killing cancer cells in laboratory settings, they often have harmful effects on healthy cells in the body. This intrinsic imprecision can engender considerable detrimental consequences, including increased toxicity, impaired immune responses, and a reduced quality of life for those impacted. To address these limitations, Nano medicine has surfaced as an innovative approach to cancer treatment. Nanoparticles possess unique physical and biological characteristics that enable the more accurate delivery of therapeutic compounds to tumoursites. As a result, targeted drug delivery systems (TDDS) utilizing nanotechnology can augment drug concentrations at the tumour , while simultaneously lessening damage to healthy tissues . This article discusses various nanotechnology-based pharmaceutical platforms used for cancer metastasis therapy, highlighting their design strategies, benefits, and limitations compared with conventional chemotherapy. Additionally, it evaluates how nanomaterials may enhance the effectiveness and safety of treatments aimed at controlling and treating cancer metastasis.

Key words: nanotechnology, chemotherapy, tumours, Nano medicine, cancer, metastasis