



Scopus



[Back](#)

Nanoparticles as Novel Drug Delivery Systems for Cancer Treatment: Current Status and Future Perspectives

[Current Pharmaceutical Design](#) • Review • 2025 •

DOI: 10.2174/0113816128368718250320060346

[Liew, Kai Bin](#)^a ; [Phang, Hiu Ching](#)^a; [Tan, Vinie Ying Xuan](#)^a; [Kee, Phei Er](#)^b; [Ming, Long Chiau](#)^c; [+5 authors](#)

^a Faculty of Pharmacy, University of Cyberjaya, Persiaran Bestari, Selangor, Cyberjaya, Malaysia

[Show all information](#)

0

Citations

[Full text](#) [Export](#) [Save to list](#)

[Document](#)

[Impact](#)

[Cited by \(0\)](#)

[References \(98\)](#)

[Similar documents](#)

Abstract

Cancer continues to pose a significant global health challenge, demanding innovative therapeutic approaches to overcome the limitations of conventional treatments like chemotherapy and radiotherapy. Nanoparticles (NPs) have emerged as promising tools for cancer therapy due to their unique physicochemical properties that enable targeted drug delivery, reduced systemic toxicity, and enhanced therapeutic efficacy. This comprehensive review delves into the mechanisms of NP-based drug delivery, highlighting both passive and active targeting strategies. It categorizes and discusses diverse NP types, including polymeric, lipid-based, and metallic nanoparticles, emphasizing their applications in enhancing the bioavailability and specificity of anticancer agents. This review also explores the integration of advanced technologies, such as theranostics and artificial intelligence, to optimize NP design and functionality for personalized medicine. However, challenges remain,

including issues related to toxicity, drug resistance, and manufacturing scalability. Addressing these barriers requires interdisciplinary research focused on developing stimuli-responsive NPs, improving biocompatibility, and incorporating multimodal therapeutic platforms. Although substantial progress has been made, this review is limited by the paucity of clinical trials validating NP efficacy and safety in diverse patient populations. Future endeavors should prioritize translational research to bridge the gap between preclinical innovations and clinical applications, ensuring that these transformative technologies benefit a broader spectrum of cancer patients. The review underscores the immense potential of NPs in redefining cancer treatment while advocating for sustained research to address existing limitations and unlock their full therapeutic promise. © 2025 Bentham Science Publishers

Author keywords

anti-cancer; cancer treatment; drug delivery; Nanoparticles; targeted therapy, radiotherapy, chemotherapy agents

Indexed keywords

EMTREE drug terms

antineoplastic agent; lipid; metal nanoparticle; nanoparticle

EMTREE medical terms

antineoplastic activity; artificial intelligence; bioavailability; biocompatibility; cancer inhibition; cancer patient; cancer therapy; drug delivery device; drug delivery system; drug resistance; drug therapy; drug toxicity; electric potential; human; malignant neoplasm; nonhuman; personalized medicine; pharmaceuticals; pharmacology; physical chemistry; polymerization; radiotherapy; review; therapy; translational research

Chemicals and CAS Registry Numbers

Unique identifiers assigned by the Chemical Abstracts Service (CAS) to ensure accurate identification and tracking of chemicals across scientific literature.

lipid

66455-18-3

Funding details

Details about financial support for research, including funding sources and grant numbers as provided in academic publications.

Funding sponsor	Funding number	Acronym
Ministry of Higher Education, Malaysia See opportunities by MOHE ↗	FRGS/1/2021/SKK0/UOC/02/2	MOHE
Ministry of Higher Education, Malaysia See opportunities by MOHE ↗		MOHE

Funding text

The work was supported by the Ministry of Higher Education Malaysia (MOHE) under the Fundamental Research Grant Scheme (FRGS) (Grant No.: FRGS/1/2021/SKK0/UOC/02/2).

Corresponding authors

Corresponding author	K.B. Liew
Affiliation	Faculty of Pharmacy, University of Cyberjaya, Persiaran Bestari, Selangor, Cyberjaya, 63000, Malaysia
Email address	liewkaibin@cyberjaya.edu.my

© Copyright 2025 Elsevier B.V., All rights reserved.

Abstract

- Author keywords
- Indexed keywords
- Chemicals and CAS Registry Numbers
- Funding details
- Corresponding authors

About Scopus

[What is Scopus](#)

[Content coverage](#)

[Scopus blog](#)

[Scopus API](#)

[Privacy matters](#)

Language

[日本語版を表示する](#)

[查看简体中文版本](#)

[查看繁體中文版本](#)

[Просмотр версии на русском языке](#)

Customer Service

[Help](#)

[Tutorials](#)

[Contact us](#)

ELSEVIER

[Terms and conditions](#) ↗ [Privacy policy](#) ↗ [Cookies settings](#)

All content on this site: Copyright © 2025 [Elsevier B.V.](#) ↗, its licensors, and contributors. All rights are reserved, including those for text and data mining, AI training, and similar technologies. For all open access content, the relevant licensing terms apply.

We use cookies to help provide and enhance our service and tailor content. By continuing, you agree to the [use of cookies](#) ↗.

