

Current Drug Delivery

[Editor-in-Chief >>](#)

 ISSN (Print): 1567-2018
 ISSN (Online): 1875-5704

[Back](#) [Journal](#) [Subscribe](#)

Mini-Review Article

Super Para-Magnetic Iron Oxide Nanoparticles (SPIONs) in the Treatment of Cancer: Challenges, Approaches, and Its Pivotal Role in Pancreatic, Colon, and Prostate Cancer

(E-pub Ahead of Print)

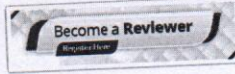
Published on: 25 August, 2022

 Author(s): [Sameea Ahmed Khan](#) and [Rajesh Sharma*](#)

 DOI: [10.2174/1567201819666220509164611](https://doi.org/10.2174/1567201819666220509164611)

Price: \$95

Purchase PDF



Article Metrics



4

Abstract

Super Para-magnetic Iron Oxide Nanoparticles (SPIONs) have been manifested for their broad spectrum of applications ranging from biomedical imaging to the treatment of many diseases. Many experiments are being conducted across the globe to especially investigate their potential in the field of targeted treatment for malignant tissues. However, challenges pertaining to the desired delivery of anticancer drugs in the body remain unresolved or unattended. The bare iron oxide nanoparticles are liable to form agglomerates or get easily oxidized in the air which can lead to loss of their magnetism and viability. Moreover, in several reactions, these magnetic nanoparticles leach into the solution/ suspension, making it kinetically unstable. The nanoparticles, further readily metabolize in the stomach pH or are phagocytosed by macrophages. In this article, we address these issues by shedding light on the impact of controlling parameters like size, synthesis method, and surface engineering. After studying the existing literature, it is noted that currently, these magnetically guided delivery systems are being rigorously tested in areas like pancreatic cancer, colon cancer, and prostate cancer, which will be discussed in this review. The fact that the major issue in the conventional treatment of these cancers is intrinsic and acquired drug resistance is a key issue. In this context, the potential of SPIONs as efficient nanotherapeutics is presented. The article provides a deeper insight into the research conducted on these focused areas in cancer. This review also discusses, in brief, the consolidation of artificial intelligence in cancer nanomedicine assuring a better treatment outcome in near future.

Keywords: [Nanoparticles](#), [SPIONs](#), [targeted therapy](#), [tumor treatment](#), [pancreatic cancer](#), [colon cancer](#), and [prostate cancer](#).

[Mark Item](#) [Purchase PDF](#) [Rights & Permissions](#) [Print](#) [Export](#) [Cite as](#)

FIND YOUR INSTITUTION

Journal Information

- > [About Journal](#)
- > [Editorial Board](#)
- > [Current Issue](#)
- > [Volumes/Issues](#)

[For Authors & Reviewers](#)
[Explore Articles](#)
[Open Access](#)
[For Visitors](#)

We recommend

Evaluation of Anticancer Activities of Gallic Acid and Tartaric Acid Vectorized on Iron Oxide Nanoparticles
 Lina Saleh et al., Drug Delivery Letters, 2019

Macrophage-Mediated Delivery of Fe₃O₄-Nanoparticles: A Generalized Strategy to Deliver Iron to Tumor Microenvironment
 Cong Wu et al., Curr Drug Deliv, 2022

Recent Advances in the Development of Polymeric Nanocarrier Formulations for the Treatment of Colon Cancer
 Sahil Kumar et al., Drug Delivery Letters, 2018

Multifunctional ^{99m}Tc-5-azacitidine gold nanoparticles: Formulation, in vitro cytotoxicity,

Controlled temperature-mediated curcumin release from magneto-thermal nanocarriers to kill bone tumors
 A. Khodaei et al., Bioactive Materials, 2022

Delivery of therapeutic oligonucleotides in nanoscale
 Lei Wu et al., Bioactive Materials, 2022

Delivery of triptolide with reduction-sensitive polymer nanoparticles for liver cancer therapy on patient-derived xenografts models
 Mengxue He et al., Chinese Chemical Letters, 2020

Biohybrid Micro- and Nanorobots for Intelligent Drug Delivery