IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 3, Issue 1, April 2023
Impact Factor: 7.301

Characterizing Spions for Enhanced Tumor-Specific Drug Delivery and Cardiovascular Safety in Doxorubicin Treatment

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Abstract: *Superparamagnetic iron oxide nanoparticles (SPIONs) have emerged as versatile drug carriers with the potential to enhance the efficacy of cancer therapeutics, such as doxorubicin (DOX), while minimizing cardiovascular toxicity. This paper reviews the recent developments in characterizing SPIONs to optimize their performance in tumor-specific drug delivery and mitigate cardiovascular side effects associated with DOX treatment. We discuss the physicochemical properties of SPIONs, including size, surface chemistry, and magnetic behavior, and their influence on drug loading, release, and targeting. Furthermore, we explore advanced characterization techniques, such as imaging and spectroscopy, that provide insights into SPION biodistribution and pharmacokinetics. The integration of these characterizations into the design and evaluation of SPION-based drug delivery systems holds great promise for personalized cancer therapy with improved safety and efficacy.*

Keywords: SPION Characterization, Tumor-Specific, Drug Delivery, Cardiovascular Safety, Doxorubicin Treatment

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