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Developing Spion-Based Nanocarriers for Targeted Tumor Therapy with Reduced Doxorubicin Cardiotoxicity

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Abstract: *Tumor therapy using chemotherapy, particularly doxorubicin (DOX), remains a cornerstone in cancer treatment. However, the clinical efficacy of DOX is often limited by its off-target toxicity, notably cardiotoxicity. This paper explores the development of superparamagnetic iron oxide nanoparticle (SPION)-based nanocarriers as a promising strategy for targeted tumor therapy with the objective of minimizing DOX-induced cardiotoxicity. We discuss the rationale behind SPION-based nanocarriers, their unique properties, and their potential to enhance drug delivery specificity while mitigating systemic side effects. Additionally, we delve into recent advancements in nanocarrier design, targeting strategies, and preclinical studies that demonstrate the potential of this approach. Ultimately, the development of SPION-based nanocarriers represents a promising avenue for improving the safety and efficacy of DOX-based tumor therapy.*

Keywords: Tumor

REFERENCES

[1]. Freeman, M., Arrott, A., Watson, J., 1960. Magnetism in medicine. Journal of Applied Physics 31, S404-S405.
[2]. Gaihre, B., Aryal, S., Khil, M.S., Kim, H.Y., 2008. Encapsulation of Fe3O4 in gelatinnanoparticles: Effect of different parameters on size and stability of the colloidal dispersion. Journal of microencapsulation 25, 21-30.
[3]. Gamonpilas, C., Pongjaruvat, W., Methacanon, P., Seetapan, N., Fuongfuchat, A., Klaikherd, A., 2013. Effects of cross-linked tapioca starches on batter viscosity andoil absorption in deep-fried breaded chicken strips. Journal of food engineering 114, 262-268.
[4]. Gewirtz, D., 1999. A critical evaluation of the mechanisms of action proposed for the antitumor effects of the anthracycline antibiotics adriamycin and daunorubicin. Biochemical Pharmacology 57, 727-741.
[5]. Ghosh, S., Yesilyurt, V., Savariar, E.N., Irvin, K., Thayumanavan, S., 2009. Redox, ionic strength, and pH sensitive supramolecular polymer assemblies. Journal of Polymer Science Part A: Polymer Chemistry 47, 1052-1060.
[6]. Gonçalves, P.M., Noreña, C.P.Z., da Silveira, N.P., Brandelli, A., 2014. Characterization of starch nanoparticles obtained from Araucaria angustifolia seeds by acid hydrolysis and ultrasound. LWT-Food Science and Technology 58, 21-27.
[7]. Grote, C., Lazik, W., Heinze, T., 2003. Tartaric Acid Starch Ether: A Novel Biopolymer-Based Polyelectrolyte. Macromolecular rapid communications 24, 927- 931.
[8]. Gupta, A.K., Curtis, A.S., 2004. Lactoferrin and ceruloplasmin derivatized superparamagnetic iron oxide nanoparticles for targeting cell surface receptors. Biomaterials 25, 3029-3040.
[9]. Gupta, A.K., Gupta, M., 2005a. Cytotoxicity suppression and cellular uptake enhancement of surface modified magnetic nanoparticles. Biomaterials 26, 1565-1573.

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[10]. Gupta, A.K., Gupta, M., 2005b. Synthesis and surface engineering of iron oxide nanoparticles for biomedical applications. Biomaterials 26, 3995-4021.

[11]. Han, J., Guo, X., Lei, Y., Dennis, B.S., Wu, S., Wu, C., 2012. Synthesis and characterization of selenium–chondroitin sulfate nanoparticles. Carbohydratepolymers 90, 122-126.

[12]. Hanahan, D., Weinberg, R.A., 2000. The hallmarks of cancer. cell 100, 57-70. Hentze, M.W., Muckenthaler, M.U., Andrews, N.C., 2004. Balancing acts: molecular control of mammalian iron metabolism. cell 117, 285-297.

[13]. Herrero, A.M., Carmona, P., Jiménez-Colmenero, F., Ruiz-Capillas, C., 2014. Polysaccharide gels as oil bulking agents: Technological and structural properties. Food Hydrocolloids 36, 374-381.

[14]. Hilger, I., Hiergeist, R., Hergt, R., Winnefeld, K., Schubert, H., Kaiser, W.A., 2002. Thermal ablation of tumors using magnetic nanoparticles: an in vivo feasibility study. Investigative radiology 37, 580-586.

[15]. Hobbs, S.K., Monsky, W.L., Yuan, F., Roberts, W.G., Griffith, L., Torchilin, V.P., Jain, R.K., 1998. Regulation of transport pathways in tumor vessels: role of tumor type and microenvironment. Proceedings of the National Academy of Sciences 95, 4607-4612.

[16]. Homayouni, A., Azizi, A., Ehsani, M., Yarmand, M., Razavi, S., 2008. Effect of microencapsulation and resistant starch on the probiotic survival and sensory properties of synbiotic ice cream. Food chemistry 111, 50-55.

[17]. Ip, A.C.-F., Tsai, T.H., Khimji, I., Huang, P.-J.J., Liu, J., 2014. Degradable starch nanoparticle assisted ethanol precipitation of DNA. Carbohydrate polymers 110, 354- 359.

[18]. Iyer, A.K., Khaled, G., Fang, J., Maeda, H., 2006. Exploiting the enhanced permeability and retention effect for tumor targeting. Drug discovery today 11, 812- 818.

[19]. Jain, A., Thakur, K., Sharma, G., Kush, P., Jain, U.K., 2016. Fabrication, characterization and cytotoxicity studies of ionically cross-linked docetaxel loaded chitosan nanoparticles. Carbohydrate polymers 137, 65-74.

[20]. Jain, R.K., Stylianopoulos, T., 2010. Delivering nanomedicine to solid tumors. Nature reviews Clinical oncology 7, 653-664.

[21]. Jain, T.K., Morales, M.A., Sahoo, S.K., Leslie-Pelecky, D.L., Labhasetwar, V., 2005. Iron oxide nanoparticles for sustained delivery of anticancer agents. Molecular pharmaceutics 2, 194-205.

[22]. Jain, T.K., Richey, J., Strand, M., Leslie-Pelecky, D.L., Flask, C.A., Labhasetwar, V., 2008. Magnetic nanoparticles with dual functional properties: drug delivery and magnetic resonance imaging. Biomaterials 29, 4012-4021.

[23]. Jang, S.H., Wientjes, M.G., Lu, D., Au, J.L.-S., 2003. Drug delivery and transport to solid tumors. Pharmaceutical research 20, 1337-1350.

[24]. Jiang, J., Tong, X., Morris, D., Zhao, Y., 2006. Toward photocontrolled release using light-dissociable block copolymer micelles. Macromolecules 39, 4633-4640.

[25]. Jiang, W., Xie, H., Ghoorah, D., Shang, Y., Shi, H., Liu, F., Yang, X., Xu, H., 2012. Conjugation of functionalized SPIONs with transferrin for targeting and imaging brain glial tumors in rat model. PLoS One 7, e37376.