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Remarkable Medicine Technology and Evolution of Targeted Drug Administration

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Opinion Article

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ABOUT THE STUDY

Targeted drug administration has evolved as a remarkable medicine technology for treating abnormal and ill bodily parts directly avoiding negative effects on other healthy organs in the human body. Nanocomposite materials have shown to be a main focus for targeted medicine delivery due to their capacity to carry a sufficient drug concentration and release it directly to the organ to be treated. The purpose of this paper is to describe briefly about the role of metal–ferrite nanocomposites in medication delivery targeting. This will entail the development of several metal–ferrite nanocomposites synthesis approaches as well as their compositional flexibility, as the synthesis route has a significant impact on the structure of nanocomposites.

The performance of these nanocomposites in terms of drug release has been discussed, as determined by several scientists through *in vitro* investigations. The presented literature has been incorporated to better grasp the conceptual concreteness of drug release properties such as drug loading efficiency, biocompatibility, and drug solubility, as well as the optimization criteria. Each type of nanocomposites, such as nanoparticles, 1D, 2D, and 3D nanostructures, has been investigated for its distinct properties in terms of drug transporting and release. Furthermore, the magnetic ferrite nanocomposites-based drug delivery systems as well as possible future perspectives through a critical

examination of current approaches' flaws are mentioned. Gold nanoparticles were also used to deliver targeted drug delivery. By conjugating nanoparticles with targeting ligands, spatially tailored drug delivery systems can be constructed, allowing for the preferential distribution of nanotherapeutics to the locations of interest while avoiding unwanted side effects elsewhere. Gold nanoparticles have been extensively researched as a versatile platform for optimizing physicochemical properties for targeted drug administration. They can be functionalized with cytosolic-directing or targeting diagnostic or therapeutic substances.

The effects of the galactose targeting ligand, PEGylation, and nanoparticle size on hepatocyte targeting were studied to illustrate the potential of gold nanoparticles as targeted drug carrier systems. They generated and analyzed nanoparticles with variable particle size, surface charge, surface hydrophilicity, and ligand density. The choice of targeting ligand is an important factor in the creation of a targeted drug delivery system. Biocompatibility, cell specificity, and binding affinity of the targeting ligand, purity of the ligand, size and charge of the ligand molecule, and ease of modification and conjugation to the nanoparticles are all factors to consider when choosing a targeting ligand.

Conjugation of thiol-derivatized PEG units made the Nano vector biocompatible. They employed TNF in the production of gold nanoparticles as a solid tumors targeting and treatment agent. The suggested vector escapes detection and clearance by the RES and sequesters TNF within the tumor actively and selectively. When compared to cancer cells, the modified system revealed to be more cytotoxic than native TNF.

Aptamers have lately being looked into as potential cancer-targeting ligands. Nanoparticles with aptamer conjugations are employed for medicinal and imaging purposes. Gold nanoparticles conjugated with aptamers are used as contrast agents in reflectance imaging. Researchers have developed a colorimetric assay combining the selectivity and affinity of aptamers with the spectroscopic advantages of gold nanoparticles to allow for the sensitive detection of cancer cells.