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Abstract

Magnetic core-shell nanoparticles for cancer therapy and imaging

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One of the most important things in designing new drug delivery systems is to deliver the drug to a specific tissue. Drug delivery to the cancerous mass and overcoming barriers is one of the aspects that has received a lot of attention and new drug delivery systems have been highly welcomed in this regard. In cancer therapy, due to the non-specific distribution of the drug, it is necessary to use a high dose of the drug, which results in the introduction of a very toxic and deadly drug get into non-target organs and severe side effects in the patient. Targeted systems with targeting ligands provide controlled drug release and specific drug delivery to the target tissue. Another very important issue in targeted drug delivery is the possibility of simultaneous control and evaluation of treatment with one of the common imaging methods in medicine. Accordingly, the use of a molecule or ligand in the structure of nanoparticles, which can give this property to nanoparticles, is of particular importance. Intelligent and targeted nanoparticle systems with the possibility of simultaneous imaging in the treatment pathway, offer the most efficient and powerful drug delivery systems.

In the intravenous administration of nanoparticles to treat cancer, fortunately, the activity of

endocytosis on cancerous tissues, as well as the high blood supply to these tissues, has caused the drug nanoparticles to accumulate more in these tissues. Application of poly alkyl cyanoacrylate, poly lactic glycolic acid or albumin nanoparticles containing anticancer drugs such as doxorubicin, 5-fluoro uracil and methotrexate has been able to control cancer cells in animals better than conventional drug. Despite extensive research on nanoparticle systems for cancer treatment, only few of these systems have been approved by the FDA. Liposomal doxorubicin (MyocetTM), polyethylene glycol (Doxil® and Caelyx®) -bonded liposomal liposomal, and Abraxane®-linked albumin are approved medicines that have entered the pharmaceutical market.

Inorganic nanoparticles have attracted much attention in cancer diagnosis and treatment

systems. These nanoparticles are often coated as the core with various polymeric, polysaccharide, lipid, dendrimer, etc. as the shell, in order to provide multifunctional drug carriers for targeted drug delivery with higher efficiency and higher drug loading, and also to the reason for using their physicochemical properties in various types of imaging. For example, gold nanoparticles due to dense electrons and high atomic number, quantum dots as molecular contrast agents and iron oxide nanoparticles due to magnetic properties create excellent contrast in images to diagnose disease in CT scan, fluorescent scanning and MRI, respectively. Here are some nano-particulate systems that we designed, prepared and examined for cancer therapy and imaging: 1- Polymers are considered in the design of drug-carrying nanoparticles.

Biography:

Dr Farzaaneh Zaaeri was graduated from Department of Pharmaceutics, Faculty of Pharmacy, Tehran University of Medical Sciences, Iran, in 2019. She studied pharmacy at Islamic Azad University between 1994-2000. She worked as a pharmacist for 12 years in Tehran pharmacies and Iranian pharmaceutical factories. She worked as a research assistant, 2019-2020, at Faculty of Pharmacy, TUMS. She published 9 papers in international and national journals; joined over 10 conferences in national level as participant or speaker with contributions of oral or poster. She joined over 20 conferences and workshops as participant in the last eight years (2014 - 2020). Her experimental research subjects are magnetic nanoparticles and other novel drug delivery systems in therapy and imaging of cancer..

Recent Publications:

1. 1- A pH- responsive polymer in a core-shell magnetic structure as an efficient carrier for delivery of Doxorubicin to tumor cells, Farzaaneh Zaaeri, Mehdi Khoobi, Mohammadreza Rouini, Hamid Akbari Javar. Journal of polymeric materials and polymeric biomaterials, Published online: 18 Dec 2017.