

HYDROPHOBIC POLYMER COATED SUPERPARAMAGNETIC NANOPARTICLES FOR ANTICANCER DRUG DELIVERY

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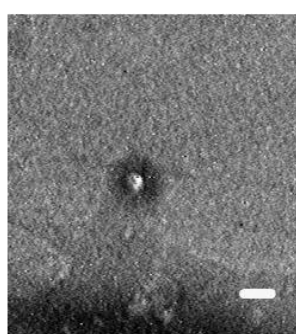
Superparamagnetic Fe_3O_4 nanoparticles have been recently used in drug delivery applications [1-4]. In this study, a novel approach to prepare magnetic polymeric nanoparticles containing superparamagnetic domains and hydrophobic polymeric shell using microemulsion-solvent evaporation method is reported.

PHEA-IB-poly(ButMA) copolymer was used as coating copolymer to obtain magnetic nanoparticles by O/W emulsion of polymer solution in the presence of 10 nm Fe_3O_4 superparamagnetic nanoparticles and the anticancer drug flutamide. Obtained magnetic nanoparticles were characterized by DLS, TEM and magnetometry.

The results obtained from TEM (Figure 1) and DLS analysis showed that the particles are spherical with average size of about 250 nm. The magnetic measurement studies revealed the superparamagnetic behavior of the nanoparticles and the presence of superparamagnetic domains inside nanoparticles. Cytotoxicity profile of the nanoparticles on LNCaP cells showed that the flutamide loaded nanoparticles, compared to free flutamide, caused a significant reduction of LNCaP cells proliferation induced by DHT. In vivo biodistribution of drug loaded into nanoparticles in rats subjected to an external magnetic field showed important quantitative differences in comparison with that obtained in the control group.

FLU was concentrated most conspicuously in kidney, and less in all the other organs (Figure 2). This modified biodistribution profile demonstrated that these nanoparticles are able to control drug biodistribution by means of an external magnetic field that may attract the nanoparticles in a specific site of the body or organ.

Obtained data shows that coated Fe_3O_4 superparamagnetic nanoparticles are potentially useful for in vivo applications in treatment of tumors.



Magnification 5k; Barra = 300 n

Figure 1

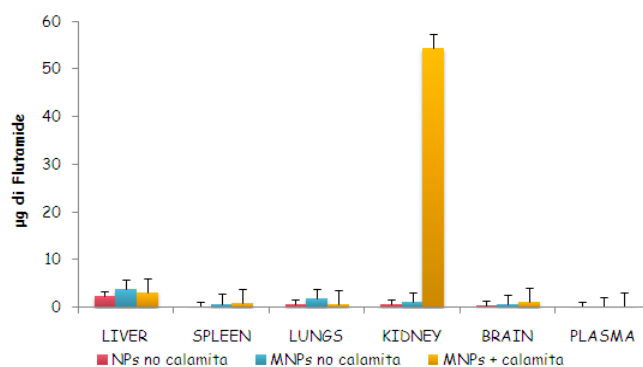


Figure 2

References

- [1] Adv. Drug Delivery Rev. 16, 321–334, 1995.
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- [4] Life Sci., 44, 175–186, 1989.