Iron oxide/oleic acid magnetic nanoparticles possessing biologically active choline derivatives as potential theranostics

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In recent years engineered magnetic nanoparticles (MNPs) represent advanced tool in biomedicine because they can be simultaneously functionalized and guided by a magnetic field. Our efforts are focused on searching of medical remedies based on iron oxide/oleic acid nanocarriers with immobilized 'small molecules', possessing different kinds of biological activity, and on developing strategies for targeted drug delivery including both molecular (suitable coating) and magnetic (iron oxide core) targeting systems. The original design consists in the fact, that the first biologically active substance is covalently coupled to magnetic core and the other amphiphilic biologically active ligand subsequently immobilized on the surface of magnetic carrier by creating plasma membrane like structures around the magnetic core. Using the proposed methodology [1], we have prepared new non-toxic to normal cells, MNPs functionalized with specially synthesized aliphatic and heterocyclic choline analogues possessing antitumour and/or antimicrobial properties [2, 3]. Structural conclusions and size determination for synthesized nanosystems have been drawn based upon method of magnetogranulometry, DLS measurements and X-ray diffraction analysis. Most expected iron oxide core diameter was 7–11 nm. Aqueous magnetic fluids of MNPs synthesized were examined *in vitro* concerning monolayer HT-1080 and MG-22A tumour cell lines and normal mouse fibroblasts, as well as against different bacterial and fungal strains.

It has been demonstrated that resulting magnetic fluids revealed superparamagnetic properties and affected tumour and microbial cells.

References

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