STABILITY OF ^{207}Bi LABELED STRONTIUM HEXAFERRITE NANOPARTICLES IN BIOLOGICAL RELEVANT MEDIA

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A relatively new and promising sphere in the development of radiopharmaceuticals for the diagnosis and treatment of tumors and other tissue damage is the creation of radiolabeled nanomaterials. Nanoparticles can be synthesized as multimeric systems with specified chemical properties, geometry and configuration, while the pharmacokinetic and pharmacodynamic properties of nanoparticles can be varied by functionalizing their surface. In this work, we considered hard magnetic strontium hexaferrite nanoparticles coated with a thin layer of silicon dioxide, on the basis of which biocompatible stable colloidal solutions can be obtained. The advantage of magnetic nanoparticles is that they can also be used in diagnostics as a contrast for MRI and magneto-mechanical therapy or magnetically induced hyperthermia.

Conjugates of nanoparticles of strontium hexaferrite (the plate-like shape with an average diameter of 40 nm) and benzo-azacrown ether L (fig. 1) with six nitrogen atoms in a macrocycle were obtained by chemical surface modification. Modified strontium hexaferrite nanoparticles were analyzed by IR and Raman spectrometry. The efficiency of ligand binding to the nanoparticle surface was analyzed by thermogravimetry combined with mass spectrometry. The conditions for the complexation of the conjugate with $^{207}\text{Bi}^{3+}$ were determined by competitive liquid extraction.

For further study of this compound under in vivo conditions, the stability in saline solution and phosphate-buffered saline was studied using thin-layer chromatography. Studies on the stability of labeled strontium hexaferrite particles in fetal bovine serum have been conducted. The results show further promising research bismuth complexes with conjugates of strontium hexaferrite nanoparticles and azacrown ether as potential radiopharmaceuticals.

Figure 1. Benzo-azacrown ether L

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