

Targeted doubly labeled nanoparticles for tumor imaging

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Diagnosing cancer tumors properly, with precision in the earliest as possible stages is fundamental to increase the success of the treatments and assure better and longer survival lifetime to the patients. In this direction the use of targeted nanoparticles, especially the ones decorated with monoclonal antibodies, has been the choice for the development of new more effective contrast agents, but the preparation method are generally cumbersome and inefficient. Described is in this report, 8 nm large SPIONs simultaneously conjugated with trastuzumab and dtpa ligand. The antibody confers targeting properties while the chelating ligand the possibility of radiolabeling with ^{99m}Tc for SPECT imaging. Female Balb-c nude mice were xenografted with a breast cancer tumor model by subcutaneous injection of 2x10⁶ MDA-MB-231 cells in the right flank and imaged with a gamma camera revealing high bioaccumulation of nanoparticles. No thrombus and immune response leading to unwanted interaction and incorporation of nanoparticles by endothelium and organs, except by the kidneys, was observed in healthy mice. More than 80% of them is cleared by the renal pathway but the implanted tumor seems to increase the expression of HER2 receptors enhancing the uptake by all organs. However, even in this unfavorable situation the tumor concentrated much more radiolabeled SPIONs than the normal tissues giving a clear contrast, as expected for an efficient contrast agent for breast cancer imaging.

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