

MRI in preclinical models: a focus on nanomedicine

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Research in nanomedicine covers different areas, including drug delivery, diagnosis and imaging tools. Key players in nanomedicine are nanomaterials used as contrast agents for anatomical and functional imaging. Nanoparticles have been designed to detect and treat many diseases, with particular focus on cancer.

Magnetic resonance imaging (MRI) is one of the most promising imaging tools for clinical applications due to its non-invasive nature. Nanoparticles can be designed to contain MRI contrast agents including magnetic iron oxide nanoparticles and to carry drugs using polymers to construct a theranostic agent. Theranostic nanoparticles enables non-invasive *in vivo* imaging of nanoparticle delivery and can enable assessment of treatment responses even at early stages. In this talk, I review the most recent advances in MRI nanoparticle studies in preclinical cancer models, describing the intrinsic therapeutic effect of nanoparticles on tumor growth, their ability to alter macrophage polarization, and their diagnostic potential. Research carried out at ISS on nanoparticles specifically targeting melanomas is also included.

Finally, the new 7 T MRI system, which is being installed at the MRI Unit, is presented. This new MRI system will allow to perform innovative studies in preclinical rodent models of several human diseases.