

Multimodality imaging in nanomedicine and theranostics

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Nowadays, the aim of nanomedicine is to selectively deliver a therapeutic agent to the target tissue to achieve a selective effect while minimizing possible side effects in other organs. To accurately assess the target selectivity and the distribution of specific nanosystems in vivo a non-invasive approach applicable in experimental models and suitable to be translated into a clinical context must be developed to confirm the extraction in target tissues and uptake in non-target tissues. The most direct way to accomplish this is to “label” the nanomaterial so that it can be detected outside the body using an imaging probe or to exploit the intrinsic physical properties of the nanomaterial, like the magnetic, optical and photon energy interactions. An advanced understanding of specific molecular processes is required to develop novel early biomarkers of response and approaches with precision medicine and novel approaches to nanomedicine. Molecular imaging approaches have been developed and investigated to image these important molecular processes in vivo through the close cooperation amongst molecular biologists, chemists and imaging scientists. Multimodal imaging approaches and their integration with nano-, regenerative medicine have been developed at CNR IFC as supported by previous EU projects and national projects.