

Bimodal contrast agent for MRI and photoacoustic: synthesis and relaxometric characterization

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Multimodality imaging based on complementary modalities is a way to improve the accuracy of medical diagnosis. For such purpose, multimodal probes combining the appropriate contrastophores into a single delivery are required. The project presented here deals with the combination of two modalities: magnetic resonance imaging (MRI) which has a high spatial resolution but a weak sensibility and photoacoustic imaging (PAI) which has a better sensibility than MRI. The dual probe envisaged is based on a gadolinium chelate as contrast agent for MRI, and the ZW800-1 fluorophore for PAI. The synthesis strategy to carry out the bimodal probe (figure 1) consists in derivatizing a linker (lysine) to graft both desired functions. All synthesis intermediates were characterized by NMR and mass spectrometry. After the complexation with gadolinium ions, the compounds were characterized by mass spectrometry, relaxometry and ^{17}O NMR.

This study allows to highlight the loss of a water molecule on the inner-sphere of the gadolinium complex probably due to an additional coordination with the amide bond formed during the coupling with the linker. In addition, the grafting of the probe for photoacoustic imaging led to the formation of π -stacking interactions between the molecules.

Given these preliminary results, it would be interesting to graft a biovector in order to obtain a specific bimodal probe able to target a particular disease. *In vitro* and *in vivo* images should also be register to evaluate its effectiveness, both in MRI and PAI.

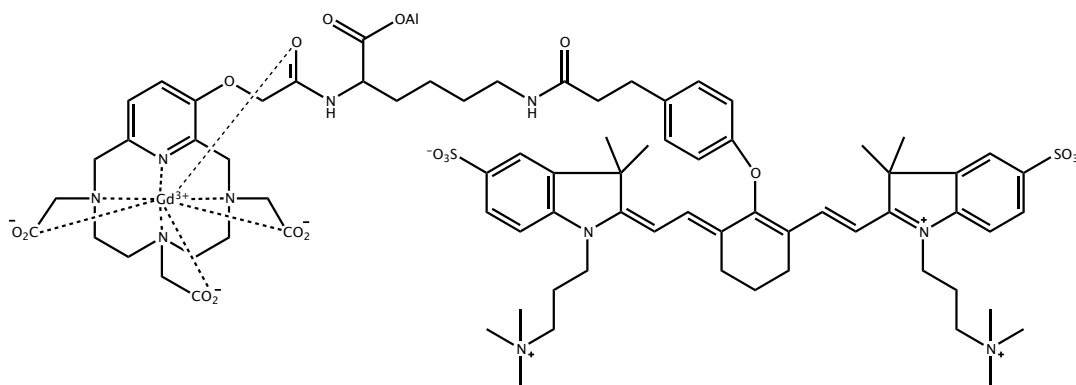


Figure 1 : Structure of bimodal probe Gd-PCTA-Lys(ZW800-1)-OAI