Design of specific regio-functionnalized pyclen-based Ln(III) complexes for two-photon excitation and application to imaging or theranostic

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Polyazamacrocycles are well-known to form stable metal complexes. Among them, thanks to the rigidity brought by its pyridine unit, pyclen has emerged as a particularly interesting platform for the conception of stable lanthanide(III) complexes.[1] The smart regiospecific *N*-functionalization of this macrocycle allows to play on the coordination number of the Ln(III) to access to monohydrated Gd(III) chelates for magnetic resonance imaging (MRI) or to Ln(III) complexes with highly luminescent properties for optical imaging. For the later, single-photon excitation that takes place in the visible spectrum is limited by the absorption and scattering of light *in vivo* and its low penetration. The development of π-conjugated chromophores as antennas for optical imaging or sensitizers for photodynamic therapy (PDT) exploiting the advantages[2] of two-photon (2P) excitation (biological transparency window, high spatial resolution) has therefore been studied.[3]

Based on these results, we designed functionalized pyclen-based Ln(III) complexes bearing π-conjugated antennas optimized for biphotonic imaging[4] and we also developed a theranostic probe combining MRI and 2P-PDT technologies (*Figure 1*).[5] Additionally, *para*-functionalization of the aromatic unit of the pyclen platform allowed the introduction of a coupling function for further *in vivo* specific targeting of these probes.

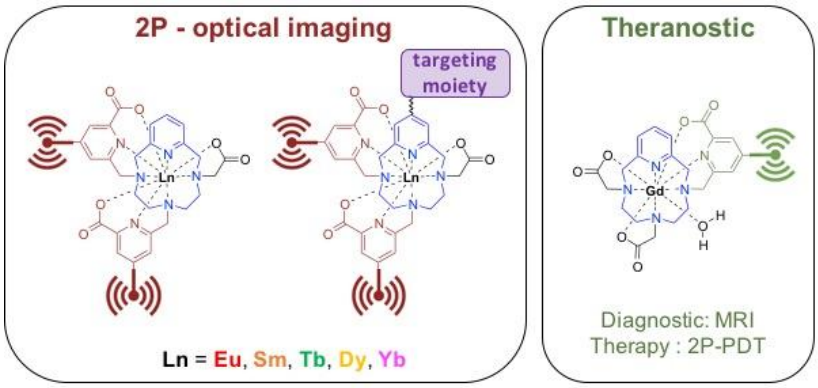

Figure 1 : General structures of the pyclen-based Ln(III) complexes.

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