MASTER'S THESIS

Synthesis and Biomedical Studies of Lanthanide-based Probes as Biomarkers

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Abstract

Primary cilia are organelles protruding from the cell membrane and can act as antennae to get information from the surroundings. Dysfunction of these organelles may result in serious liver and kidney diseases. Thus directly visualizing of primary cilia is of great value for diagnosing ciliopathies and other biomedical research. Normally, visualizing primary needs antibodies labelled with chromophores which are expensive. Here, a europium(III) based cyclen type non-toxic probe HGEu001 is developed for visualizing primary cilia. This non-toxic complex has good quantum yield (around 10%) with high stability in aqueous solution. Co-staining experiments of HGEu001 and its motif complex HGEu002 (control complex) with commercially available primary cilium markers acetylated tubulin or ARL13B in ciliated NIH3T3 cells with a two-photon confocal microscope suggest HGEu001 can specifically bind to primary cilia while HGEu002 do not have such property. Thus HGEu001 can be used for directly visualizing primary cilia with confocal microscopy.

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