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Poster title:

Bioluminiscence probe for caspase imaging inside cells based on Förster resonance energy transfer

Abstract

Nowadays, luminescent semiconductor quantum dots (QDs) are widely applied in different areas due to their unique optical properties. Modern technologies and instrumentations of laser-induced fluorescence or bioluminescence offer the possibility to study biological phenomena at a cellular or even molecular level.

Our research is focused on biologically active molecules, such as caspases, which play important roles in cell signaling regulation in normal and diseased states and are attractive targets for biological diagnosis and also for medical therapy.

In this work, synthesis and testing of a novel quantum dot luminescent probe is presented. The synthesized luminescent probe was tested by a model reaction with active human recombinant caspase-3 protein in quartz cuvette of a fluorimeter and its luminescence properties were checked by monitoring of the reaction inside the MC3T3-E1 cells treated with camptothecin. The caspase enzyme reaction is based on the specific cleavage of the DEVD peptide sequence. Thus, the BHQ-2 quencher is released, the Förster resonance transfer between quantum dot and quencher is interrupted, and consequently the red light luminescence of the quantum dot is emitted (**Figure 1**).

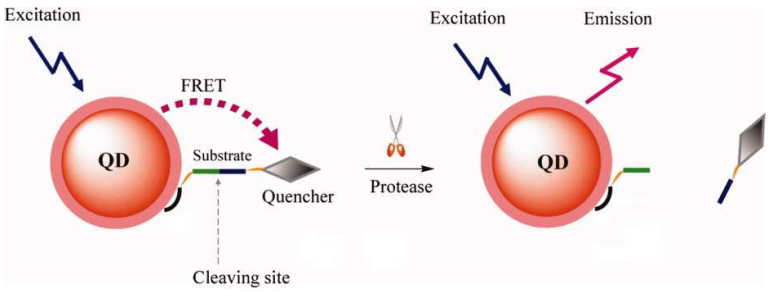

Figure 1: Scheme of the quantum dot FRET-based luminescent probe reaction with cleaving enzyme.

Thus, due to the high stability, the synthetized QD FRET-based luminescent probe proved to enable much longer observation of active caspases in living cells under fluorescence microscope than commercially available probes. The luminescence properties of the novel quantum dot luminescent probe were checked by monitoring of the reaction inside the MC3T3-E1 cells treated with camptothecin (**Figure 2**).

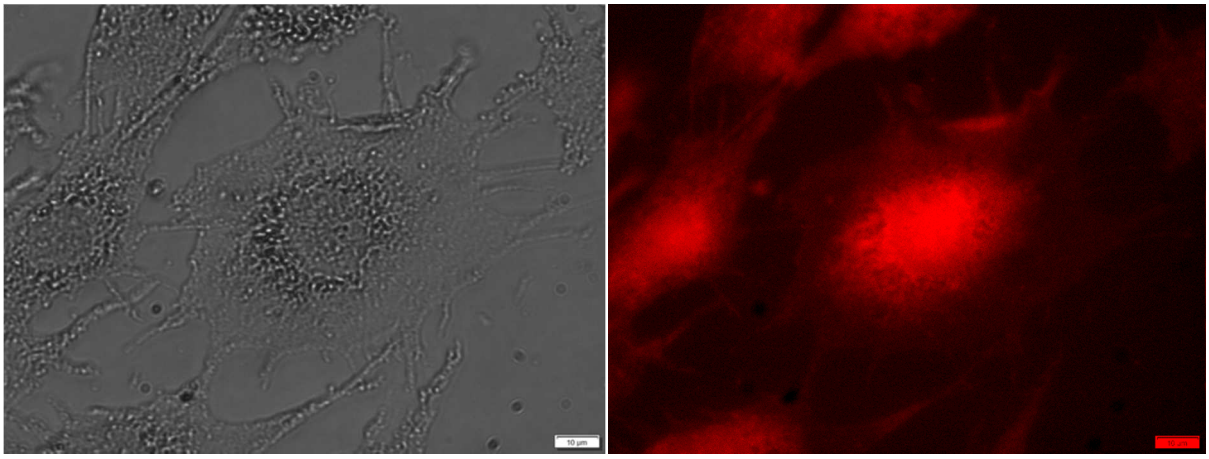

Figure 2 Comparison of the white light microscope picture (in the left) and the fluorescence microscope picture (in the right) of the MC3T3-E1cells treated with camptothecin 24 hours after incubation with fluorescent probe.

Acknowledgement

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