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Cyanine-based NIR fluorescent probe for monitoring H₂S and imaging in living cells and in vivo

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Abstract

As a critical gaseous signaling molecule, H₂S is involved in various biological processes. To deeper study the physiological and pathological roles of H₂S, convenient and efficient detection techniques for endogenous H₂S in vivo are still in urgent demand. Herein, we reported a new turn-on Near-infrared (NIR) fluorescence probe **NIR-H₂S** based on thiolysis reactions for detection of H₂S. The probe possessed many excellent properties including high sensitivity and selectivity, good cell-membrane permeability, and low cytotoxicity. In vitro, **NIR-H₂S** showed a 58-fold fluorescence enhancement when reacted with H₂S in a buffer and displayed a good linear relationship ($r = 0.9925$) in a rather wide concentration range of H₂S (0-500 μ M). Furthermore, **NIR-H₂S** was successfully employed in monitoring endogenous H₂S induced by D-Cys in living cancer cells and mice. These results indicated that **NIR-H₂S** had great potentiality in detecting cellular H₂S in living animals and being applied to cancer diagnosis.

Keywords: NIR; H₂S; cancer cell; fluorescent probe

1. Introduction

For centuries, hydrogen sulfide (H₂S) has been stigmatized as a toxic environmental pollutant with a characteristic smell. However, numerous evidences have demonstrated that endogenously produced H₂S is implicated in diverse physiological functions such as mediation of neurotransmission,[1, 2] mediation of

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