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Biodegradable hypocrellin derivative nanovesicle as a near-infrared light-driven theranostic for dually photoactive cancer imaging and therapy

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Abstract

Photoactive agents based on natural products have attracted substantial attention in clinical applications because of their distinct biological activity, molecular structure multiformity, and low biotoxicity. Herein, we initially modify hypocrellin B (HB) with 1,2-diamino-2-methyl propane to form near-infrared (NIR) light (>700 nm)-responsive amino-substituted HB derivative (DPAHB). The DPAHB exhibit broad absorption (400–800 nm), NIR emission (maximum emission peak at 710 nm), and high singlet oxygen ($^1O_2$) quantum yield (~0.33) under NIR light (721 nm) irradiation. After self-assembly by using DPAHB with PEG-PLGA, the as-prepared nanovesicles (DPAHB NVs) retain efficient $^1O_2$ generation, more interestingly, show high photothermal conversion efficiency (~0.24) under NIR light (721 nm) irradiation