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Evaluation of sulfane sulfur bioeffects via a mitochondria-targeting selenium-containing near-infrared fluorescent probe

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ABSTRACT: As a crucial member in antioxidant regulatory systems, sulfane sulfur plays essential roles in cytoprotective mechanisms by directly eliminating ROS and altering ROS-mediated redox signaling. Despite the rising interests in sulfane sulfur, there only a few bio-compatible methods are available for its direct detection. Moreover, most of the existing methods cannot meet the requirements of real-time detection due to the reactive and labile chemical properties of sulfane sulfur. Therefore, we strive to clarify the mutual relationship between mitochondria sulfane sulfur and ROS under hypoxia stress. Herein, we report a near-infrared fluorescent probe Mito-SeH for the selective imaging of mitochondrial sulfane sulfur in cells and in vivo under hypoxia stress. Mito-SeH includes three moieties: a selenol group (–SeH) as the stronger sulfur-acceptor; a near-infrared azo-BODIPY fluorophore as the fluorescent modulator; a lipophilic alkyltriphenylphosphonium cation as the mitochondrial delivery. Mito-SeH exhibits excellent selectivity and sensitivity towards