Exploring Two-Photon Excitation in Combination with Novel Multifunctional Photosensitizers for Targeted Photodynamic Therapy

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KEY WORDS: Two-photon excitation, nitric oxide photorelease, Multifunctional photosensitizers, Photodynamic Therapy

ABSTRACT
Nitric oxide (NO) photoreleasing compounds hold potential in cancer treatment due to the ability of NO to inhibit various physiological processes in cell growth and damage cancer cells [1]. Molecules releasing caged NO upon photoactivation can produce radicals directly at the site targeted for photodynamic therapy (PDT) [2]. Presented here is a principle for a dual-action photosensitizer releasing cancer-targeting NO following two-photon excitation (2PE) [2]; a novel multifunctional approach to PDT improved by the use of highly confined photoactivation, as well as simultaneous drug release and fluorescence tracking.

The fluorescence signal and cellular distribution of the compound was evaluated using confocal and multiphoton microscopy (Figure 1), the sample was then activated and imaged with 800nm 2PE. Photoactivation was used to decage the compound and track release via fluorescence intensity (Figure 2). Following development and analysis of photosensitizers in our group, presented here is a multifunctional compound able to target cancer cells via direct 2PE activation.