

Aminobenzocoumarins as Lysosomal Fluorescent Probes

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Maintaining proper pH levels is crucial for regulating the intricate cellular processes that are vital for life. Its abnormal values are indicative of aberrant cellular behavior and associated with pathologies including cancer progression or solid tumors. The sensing and monitoring of intracellular pH fluctuations are of paramount importance to comprehend physiological and pathological processes. Notably, lysosomal probes hold particular significance, as lysosomes are intricately linked to pH regulation.

Fluorescence imaging is a well-established non-invasive molecular imaging technology. Coumarins, a classical fluorescent dyes, have been widely used as a fluorophore moieties because of the excellent photophysical and chemical properties emphasizing a high fluorescence quantum yield, robust and enduring fluorescence emission, structural flexibility, efficient cell permeability without inducing cell death, straightforward preparation and low toxicity. Furthermore, these structures demonstrate large Stokes shifts substantial to prevent significant overlap between excitation and emission spectra.

In this study, we present a series of bent and linear aminobenzocoumarins adorned with various substituents. Our investigation focuses on their photophysical characteristics, revealing their pronounced pH-responsive fluorescence "turn-on" behavior in highly acidic environments, with enhancement up to 300-fold. These probes exhibit low cytotoxicity, rendering them suitable for imaging acidic lysosomes within live human cells.

Their simple structures are readily synthesized from simple naphthols by a multi-step synthesis process, enhancing their accessibility and scalability for potential applications. These compounds represent promising lead structures for future rational design of novel biocompatible fluorescent pH probes., offering potential advancements in cellular imaging techniques.

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