

SESSION II: SPEAKER ABSTRACTS

A Chemical Tool for the Study of Concentration-Dependent Formaldehyde Biology

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Controlled light-mediated delivery of biological analytes enables the investigation of highly reactivity molecules within cellular systems. As many biological effects are concentration dependent, it is critical to determine the location, time, and quantity of analyte donation. In this work, we have developed the first photoactivatable donor for formaldehyde (FA), a reactive carbonyl species capable of non-specifically crosslinking biomolecules (e.g., proteins and DNA). Our optimized photoactivatable donor, photoFAD-3, is equipped with a fluorescence readout that enables monitoring of FA release with a concomitant 139-fold fluorescence enhancement. Tuning of photostability and cellular retention enabled reliable quantification of intracellular FA release through cell lysate calibration. The application of this chemical tool uncovered the necessary FA concentration range for arresting wound healing in a monolayer of cells. This marks the first report where a photoactivatable donor for any analyte has been used to quantify intracellular release.

